FISHERY RESEARCH

Annual Performance Report
July 1, 1996 to June 30, 1997

Grant Number F-73-R-18

PROJECT 7. IRRIGATION DIVERSION FISH LOSS REDUCTION
Subproject 1. Lemhi River, Big Springs Creek, and Pahsimeroi River Canal Investigations

By:

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ANNUAL PERFORMANCE REPORT

State of: Idaho

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Subproject No.: 1. Lemhi River. Big Springs Creek. and Pahsimeroi River Canal Investigations

Contract Period: July 1. 1996 to June 30. 1997

ABSTRACT

I estimated the proportion of stream trout and char populations that were intercepted by irrigation canals. I trapped 13 diversions on the Lemhi River, Big Springs Creek (Lemhi River tributary), and the Pahsimeroi River during the 1997 irrigation season. The study canals ranged in size from 0.02 m^3/s to 0.78 m^3/s in terms of decreed water rights and most were situated on the outside of river bends in association with diversion dams. I estimated the proportion of fish potentially lost from the stream population if the screens were absent (exploitation). Exploitation estimates were determined by releasing passive-integrated-transponder (PIT)-tagged trout in the streams in the vicinity of the study canals, expanding the number recaptured in the canals by the trap efficiency estimates, and dividing the results by the number released. Rainbow trout/steelhead *Oncorhynchus mykiss* were predominant in the trap catches, so the exploitation estimates I calculated were germane to this species only. Exploitation estimates for fish s75 mm fork length (FL) ranged from 2% to 26% (n = 2), and from 2% to 43% (n = 6) for fish >75 mm (FL). Although the exploitation rates for some of the canals were low, cumulative rates could be high. For instance, the cumulative exploitation rate of fish >75 mm (FL) by four canals sampled on the Pahsimeroi River was 50%. Given such rates and the precious state of anadromous salmonids in this drainage, the presence of the Pahsimeroi River screening program would appear to be indispensable for population maintenance and possibly future enhancement. Some of the exploitation rates I calculated should be regarded as minimum estimates since some of them apply to only a portion of the irrigation season and growth recruitment from the s75 mm (FL) into the >75 mm (FL) length group may have reduced recapture rates for the former.

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INTRODUCTION

Idaho fishery managers and anglers have long suspected that significant numbers of resident salmonids are lost to irrigation diversions. However, there is little quantitative data available to assess the impacts of those losses on stream populations or to determine whether a widespread problem exists. Der Hovanisian (1995) provided a review of the literature and concluded the degree that resident fish are lost to irrigation diversions is not well documented. However, the conditions for potentially harmful repercussions on trout populations are certainly present. Hundreds of streams are diverted for agricultural purposes statewide by irrigation diversions ranging in size from a few cubic meters per second to 126 m^3/s. Although the majority of diversions in the Salmon River drainage and a few diversions in southeastern Idaho are screened to protect against fish loss, most irrigation diversions in the state are not.

The goal of this research project is to determine under what circumstances and to what degree sport fishing opportunities could be enhanced by minimizing losses of resident salmonids to irrigation diversions. The impact of these losses on the availability of harvestable-sized fish will be evaluated by estimating exploitation of stream trout populations by irrigation diversions for a variety of canals, and then modeling the effect of this source of exploitation using population parameters from trout stocks in Idaho. If exploitation by irrigation diversions is shown to have a significant impact on representative trout fisheries, then the canal characteristics associated with the highest exploitation rates will be used to classify diversions and identify potential problem sites. The cost/benefit for managing fish loss will be evaluated and solutions for minimizing losses will be recommended.

This was the third year of a five-year study. Field operations during 1997 focused on estimating trout exploitation rates for canals on the Lemhi River, Big Springs Creek (a Lemhi River tributary), and the Pahsimeroi River. Previous research in Idaho (Gebhards 1959) has indicated that the movement of fish down irrigation diversions can be most easily monitored with fish screen bypass traps. With this in mind, the canals I sampled in 1997 were screened. Thus, exploitation rates determined from this study are assumed values that would have occur'ed if screens were absent.

RESEARCH GOAL

The goal of this research project is to determine under what circumstances and to what degree sport fishing opportunities could be enhanced by minimizing losses of resident salmonids to irrigation diversions.

OBJECTIVES

1. To assess the population effects of resident salmonid losses to irrigation diversions in terms of trends in the abundance of harvestable-sized fish.

2. To identify diversion system characteristics which adversely affect resident salmonid stocks.

3. To evaluate the cost/benefit of loss management.

4. To recommend cost-effective methods for minimizing losses of resident salmonids to irrigation diversions.

Task

1. To estimate exploitation of trout by irrigation diversions on the Lemhi River, Big Springs Creek (a Lemhi River tributary), and the Pahsimeroi River during the 1997 irrigation season.

DESCRIPTION OF STUDY AREA

I sampled canals on the mainstem Lemhi River between river km 25 near Baker and river km 39, just upstream of Tendoy (Figure 1). This section of the river is channelized and has little holding or rearing habitat. Stream flows are governed by runoff and irrigation withdrawals. Big Springs Creek enters the Lemhi River around river km 69. The canals I sampled there were located between river km 5 and river km 6 (Figure 1). This section of the creek has a wide, shallow, sinuous channel. Riparian vegetation is scarce, pools are rare, and undercut banks nonexistent. Big Springs Creek is spring-fed with relatively stable flows, but is also subject to runoff and irrigation withdrawals. The canals I sampled on the mainstem Pahsimeroi River were located between river km 5 and river km 13 (Figure 2). This section of the river has reaches with moderate amounts of riparian vegetation and pool-riffle habitat. This stream is also spring-fed, but runoff and water withdrawals can affect stream flows. I also planned to sample two diversions on the Rapid River near Riggins, but sampling operations were terminated due to high flows and manpower constraints.

The 1997 irrigation season started between the first and third weeks in May at most sites and generally ended by the first or second week of October (Table 1). Some canals continued taking minimal amounts of water for livestock past that time, but the season was largely over by mid-October. Canal closures on the Lemhi and Pahsimeroi rivers may have been in response to periods of unseasonal rainfall that reduced irrigation needs, but maintenance requirements and pasture rotations may have been contributing factors.

All of the study canals were screened with paddle wheel-driven rotary drums located anywhere from 30 m (L-22) to 275 m (P-8A) down the canal from the point of divergence. Bypass pipes ranged in diameter from 10 cm to 25 cm, and the entrances to most pipes were fitted with an orifice slide gate (Figure 3) designed to pass just enough water to remain within the 0.02 m^3/s water right for each bypass. All canal intakes were located on the outside of river bends except for L-19, L-30A, BSC-3, BSC-4, and P-3 (Appendix A). Gravel berm or hay bale diversion dams were associated with all but one canal (L-19); two of these dams (P-5 and P-8A) may have been barriers to upstream and downstream fish movement. The canals ranged in size, in terms of decreed water rights, from 0.02 m^3/s to 0.78 m^3/s. Canals BSC-4, BSC-5, P-3, and P-7 diverted 10%, 28%, 24%, and 27% of the stream flow during the irrigation season, respectively. The percent of the stream flow diverted by the remaining canals could not be estimated, but probably ranged from 20% to 30%.

Salmonid species present in the vicinity of the study canals included rainbow trout and steelhead *Oncorhynchus mykiss,* brook trout *Salvelinus tontines,* bull trout *S. confluentus,* cutthroat trout *O. clarki,* chinook salmon *O. tshawytscha,* and mountain whitefish *Prosopium williamsoni.* Rainbow trout and/or steelhead were by far the most abundant species at all sites, but because differentiation in the field was not possible, they will henceforth be referred to as rainbow trout/steelhead.

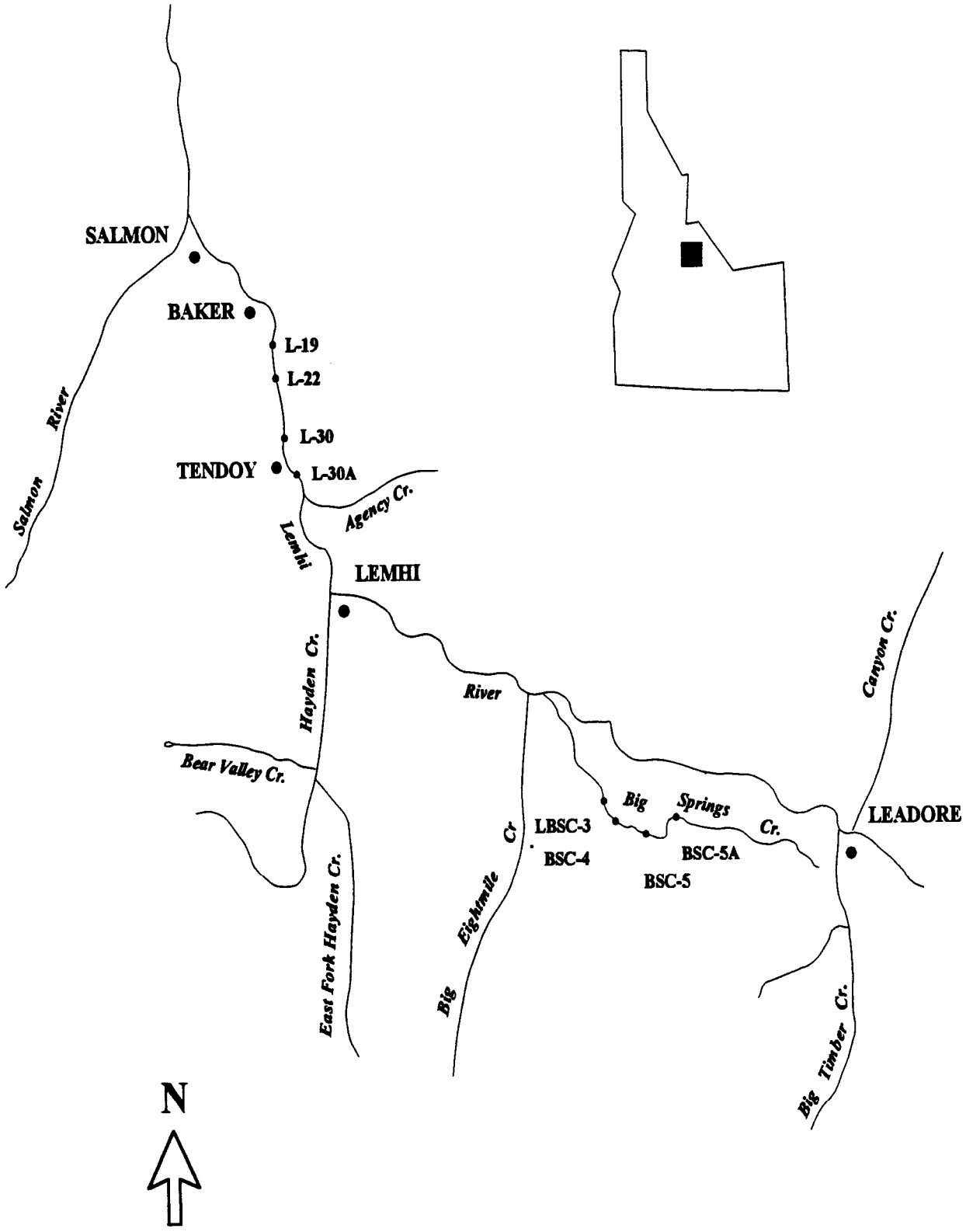

Figure 1. Location of irrigation diversion sampling sites on the Lemhi River and Big Springs Creek, Idaho, 1997 irrigation season.

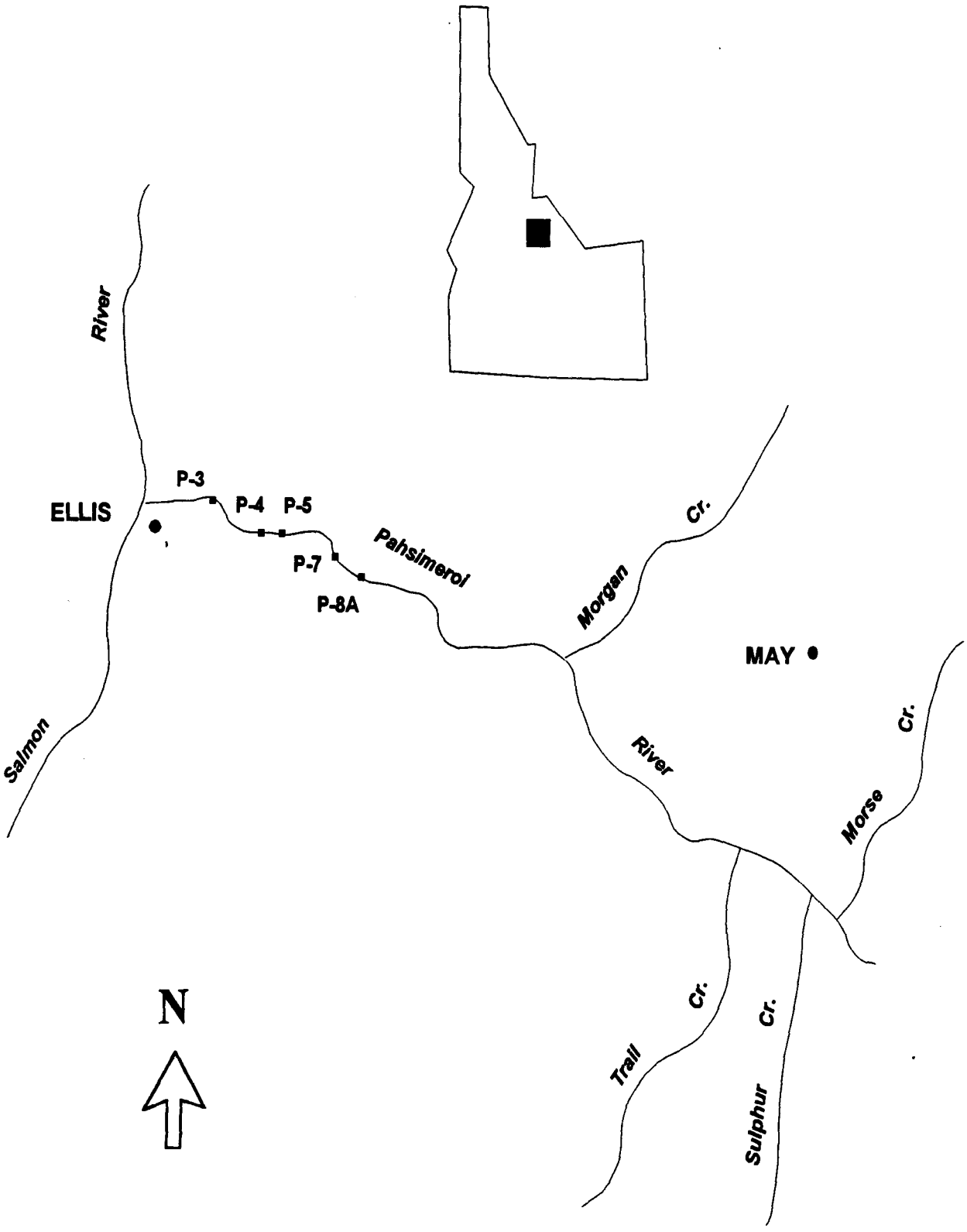

Figure 2. Location of irrigation diversion sampling sites on the Pahsimeroi River, Idaho, 1997 irrigation season.

Table 1. Periods of canal operation and closure at the irrigation diversion study sites on the Lemhi River, Big Springs Creek, and Pahsimeroi River, Idaho, 1997 irrigation season.

Canal	Canal operation	Canal closure
Lemhi River		
L-19	05/20 (season start) - 10/10 (season end)	none
L-22	05/06 (season start) - 10/03 10/10 - 10/12 (trap pulled)	10/04 - 10/09
L-30	04/29 (season start) - 10/12 (trap pulled)	none
L-30A	05/08 (season start) - 07/12 08/11 - 09/11 (season end)	07/13 - 08/10
Big Springs Creek		
BSC-3	05/06 (season start) - 10/12 (trap pulled)	none
BSC-4	05/22 (season start) - 10/12 (trap pulled)	none
BSC-5	05/17 (season start) - 10/12 (trap pulled)	none
BSC-5A	05/23 (season start) - 10/12 (trap pulled)	none
Pahsimeroi River		
P-3	05/10 (season start) - 05/28 06/26 - 08/10 08/20 - 08/22 09/03 - 09/12 10/03 - 10/04 (season end)	05/29 - 06/25 08/11 - 08/19 08/23 - 09/02 09/13 - 10/02
P-4	06/19 (season start) - 09/01 09/30 - 10/03 (season end)	09/02 - 09/29
P-5	05/10 (season start) - 09/20 09/28 - 10/10 (season end)	09/21 - 09/27
P-7	05/13 (season start) - 06/11 06/14 - 10/10 (season end)	06/12 - 06/13
P-8A	05/12 (season start) - 06/04 06/09 - 06/24 07/11 - 07/19 07/27 - 09/12 (season end)	06/05 - 06/08 06/25 - 07/10 07/20 - 07/26

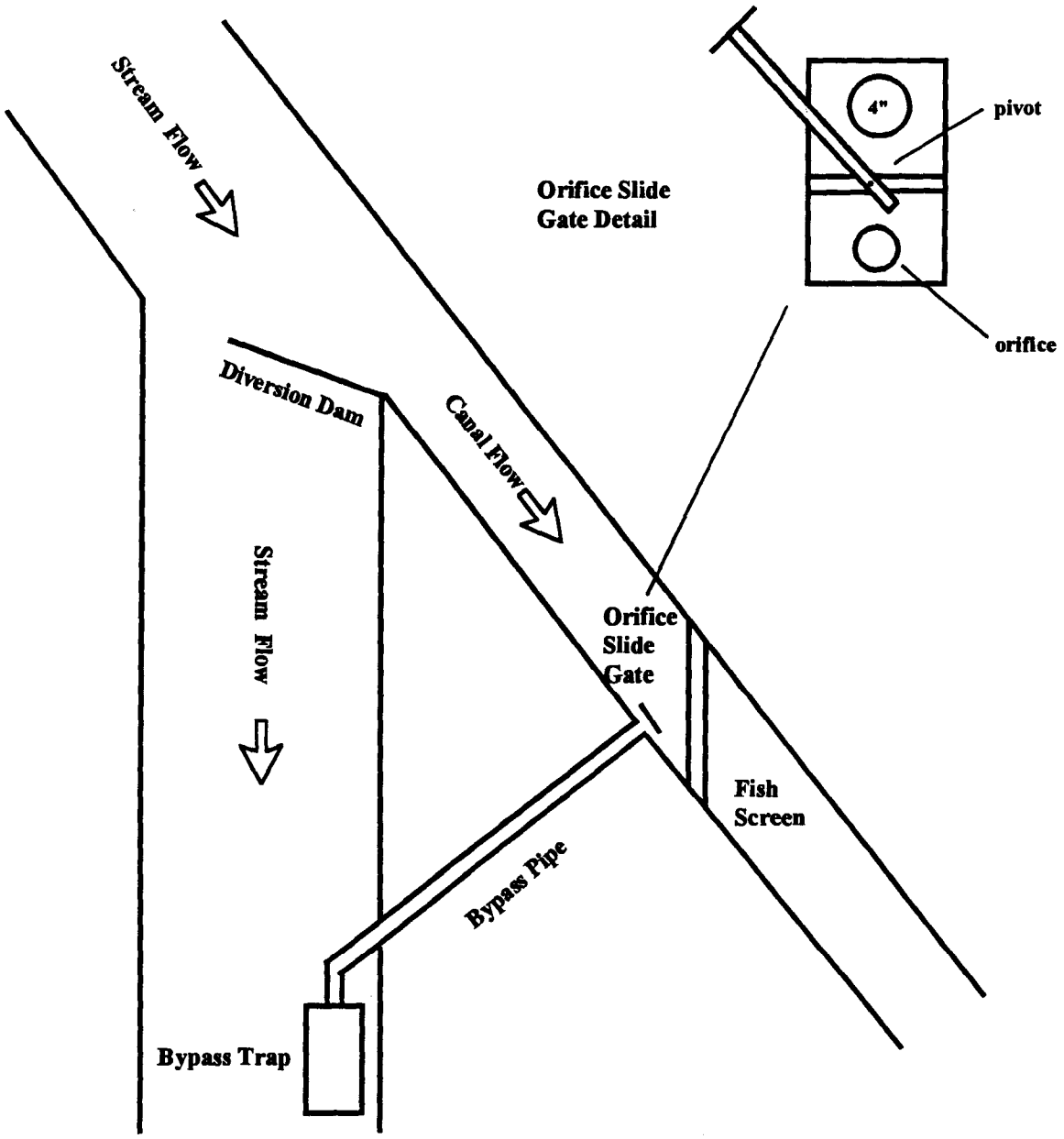

Figure 3. Typical fish screen bypass and trap configuration with orifice slide gate detail. Orifice slide gates sit at the entrances of the bypass pipes and have pivot handles. Slide gates are usually equipped with one to two orifices ranging in diameter from 2.5 cm to 12.5 cm. Fish can be passed through either orifice by turning the gate on the pivot. Orifice slide gates can also be pulled clear of bypass entrances, or adjusted to completely block-off a bypass.

METHODS

Bypass Traps and Sampling Periods

I placed trap boxes at the bypass terminus in each diversion to monitor the movement of fish into the canals (Figure 3). Trap boxes were positioned in the streams and connected to the bypass pipe with advanced drainage system (ADS) flex hose. The boxes generally measured 0.75 m wide x 0.75 m long x 0.9 m high and were constructed out of 2.5 cm steel stock and 6 mm mesh woven steel screen. The outsides of the boxes were covered with 6 mm exterior grade plywood panels to deflect stream cur'ents.

I operated the Lemhi River traps from the first week of May through the second week of October. Sampling was interrupted from June 1 to June 24 during high water flows. The L-22 and L-30 traps were removed on October 12, before the headgates were closed and only a few cubic meters per second were being withdrawn. The Big Springs Creek traps were operated continually from about the third week of May through October 12, when significant water diversion ceased. The Pahsimeroi River traps were operated from about the second week of May through the end of the season, which generally occurred during the first or second week of October.

Bypass Trap Catch

The bypass traps were checked daily. Trout and char were enumerated by species, measured to the nearest mm fork length (FL), examined for passive-integrated-transponder (PIT) tags, PIT-tagged if necessary, and released. Dates were recorded to evaluate the timing of interception of salmonids by the study canals.

Trap Efficiency

I estimated trap efficiency in each canal because: 1) changing canal flows could have affected efficiency rates; and 2) fish that entered a canal may not have necessarily passed through the bypass. The traps were checked daily for recoveries and recaptured fish were released in the stream below the canal intake. Although the availability of fish largely governed the frequency of the trap efficiency tests, I generally released marked groups of fish on a daily basis. I estimated trap efficiency by releasing marked trout upstream of the bypass in each canal. Because trout of different sizes and species may have been unequally vulnerable to capture, I estimated trap efficiency by length group (s75 mm [FL] and >75 mm [FL]) and species. Trout s75 mm (FL) were regarded as young-of-the-year (YOY) fish. Newly-captured trout were removed from the traps, anaesthetized with MS-222, identified to species, measured to the nearest mm (FL), PIT-tagged, and released 20 m to 45 m upstream of the bypass in each canal. Since PIT tags could not be used on fish <60 mm, only fish z 60 mm (FL) were used to estimate trap efficiency. I assumed that the fish released in the canals to estimate trap efficiency either entered the bypass, passed through the screens, or residualized.

I combined release (D) and recovery (d) data over consecutive time periods with similar canal staff gage measurements (Figures 4, 5, and 6) and calculated trap efficiencies for each length group and species as *d/D.* Confidence intervals were obtained using a relationship between the *F* and binomial distributions (Zar 1984, p. 378). Efficiency estimates were then compared by time period

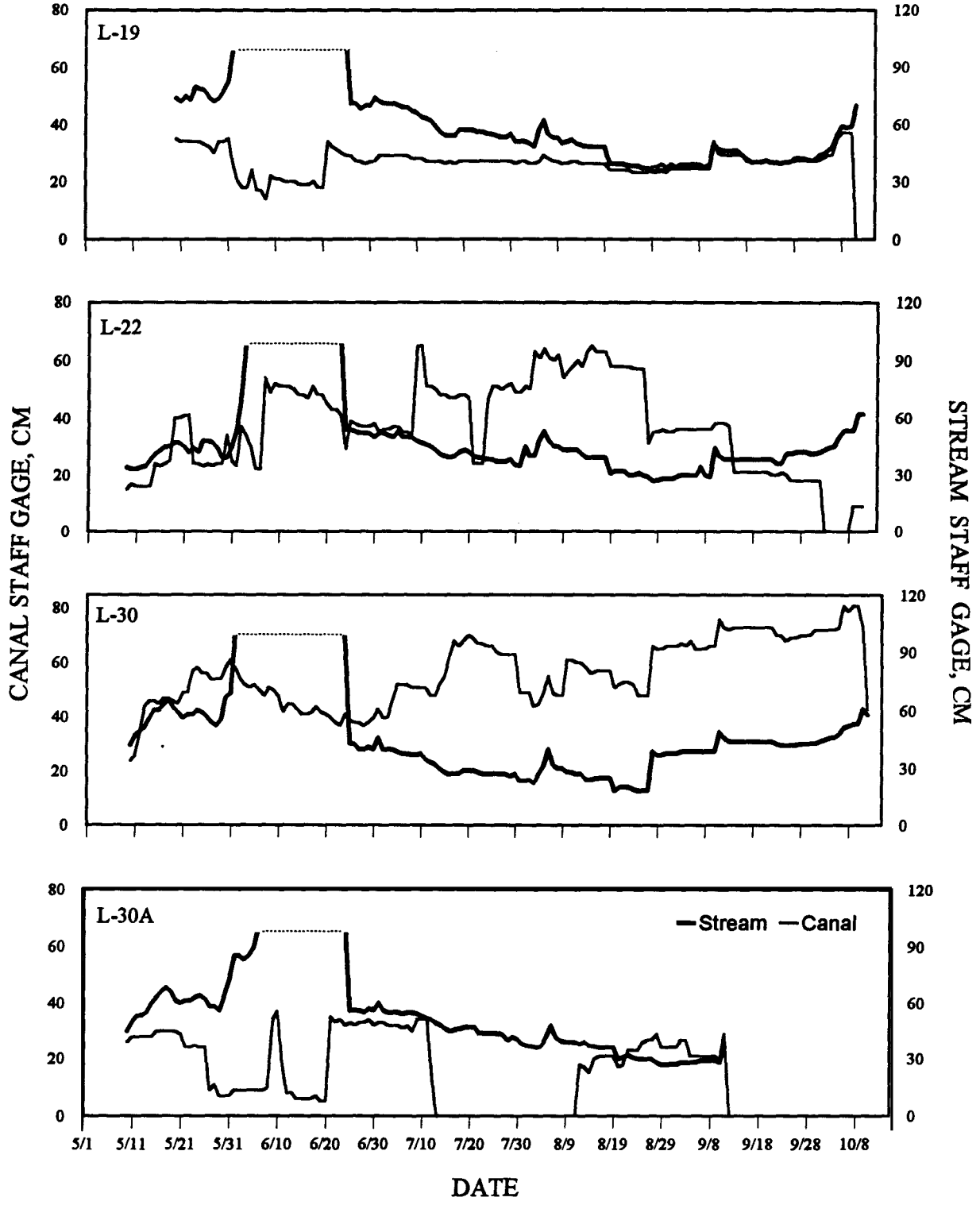

Figure 4. Lemhi River, Idaho canal and stream staff gage measurements, 1997 irrigation season. Dotted lines in stream staff gage graphs represent flood events. Zero readings in canal staff gage graphs represent periods of canal closure.

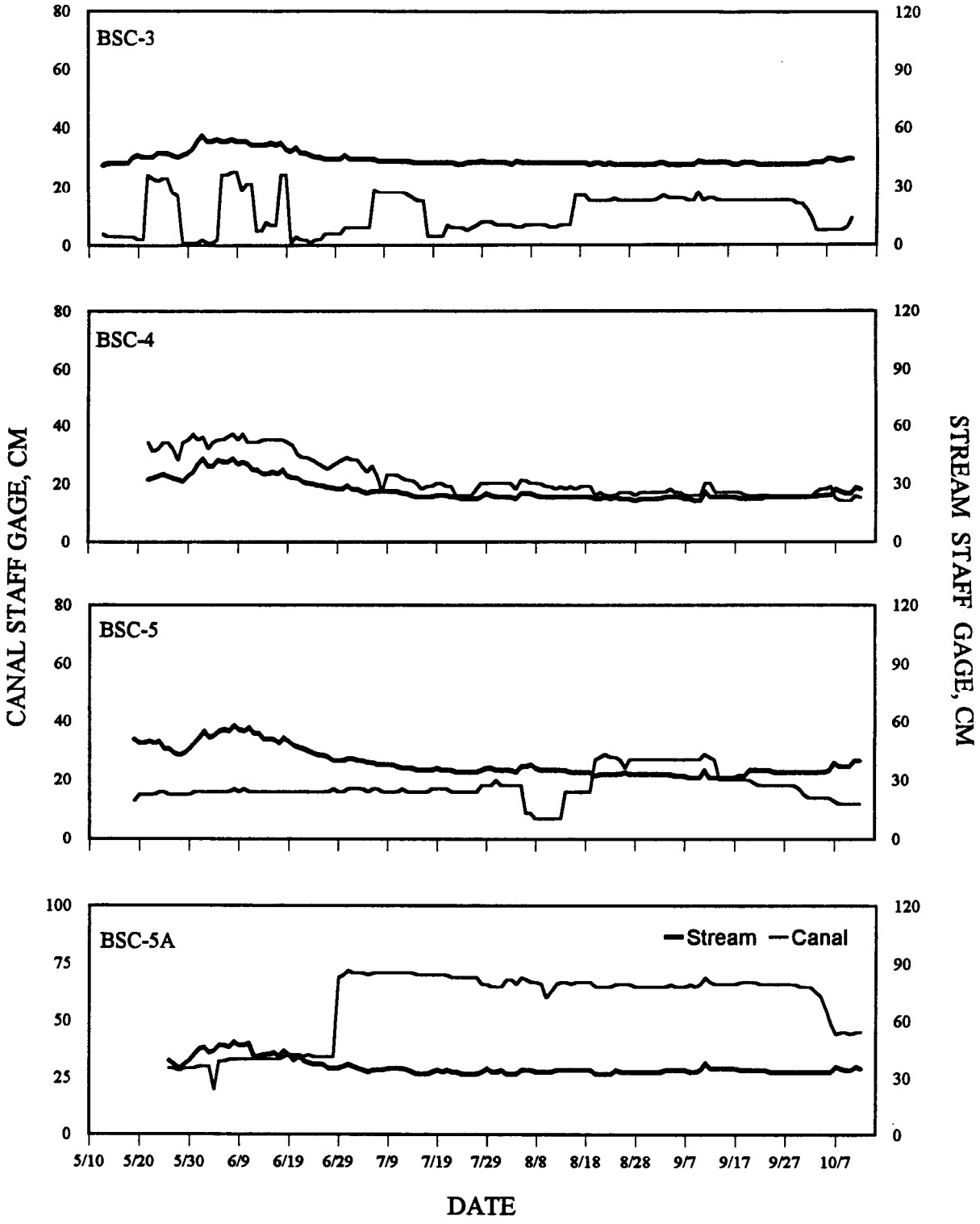

Figure 5. Big Springs Creek, Idaho canal and stream staff gage measurements, 1997 irrigation season.

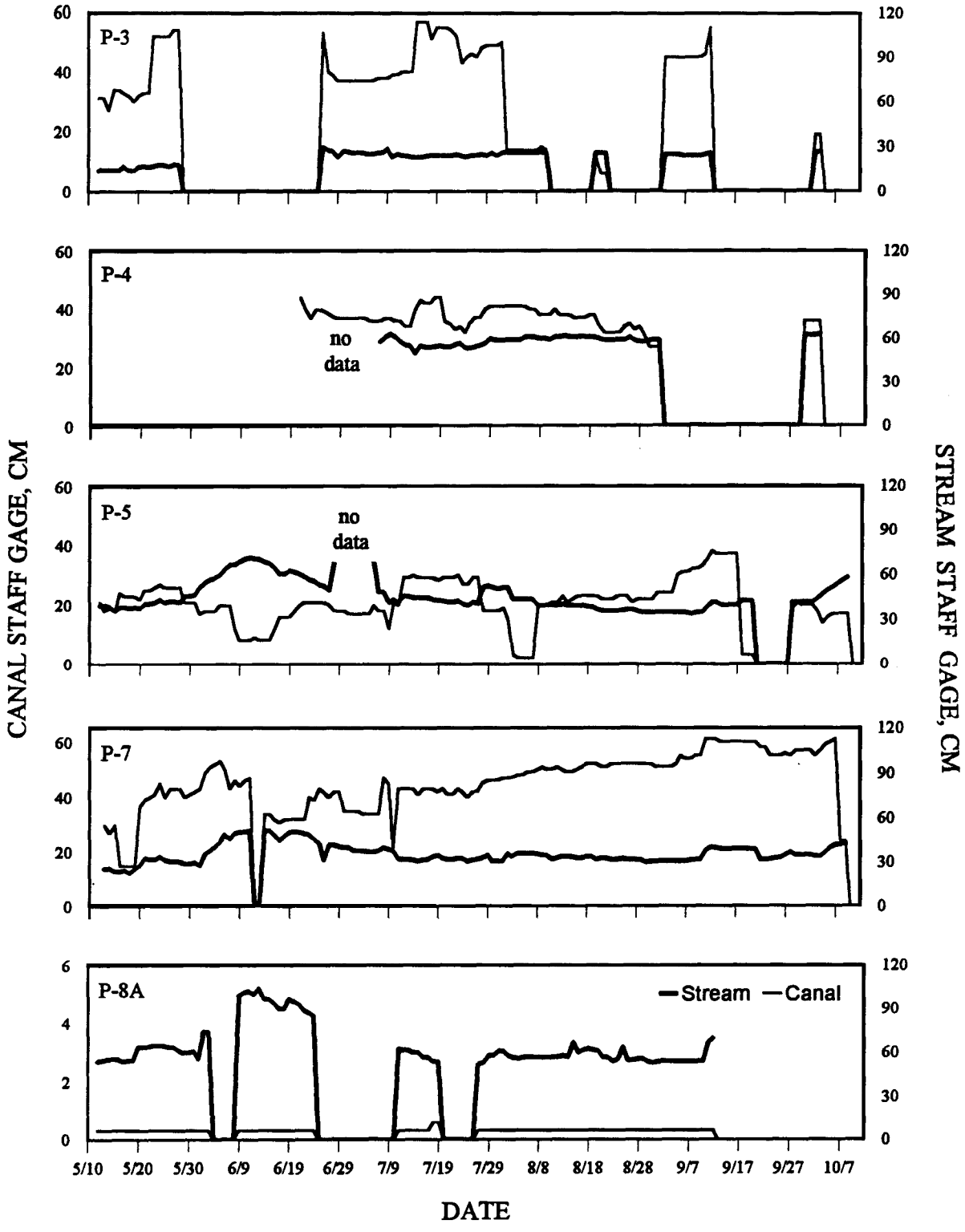

Figure 6. Pahsimeroi River, Idaho canal and stream staff gage measurements, 1997 irrigation season. Zero readings in canal staff gage graphs represent periods of canal closure. Stream staff gage data were not collected during periods of canal closure and are also represented by zero readings.

with a X^2 test. If the X^2 test indicated that the estimates were not significantly different over time, the data were pooled and used to calculate an overall trap efficiency estimate. If the X^2 test was significant or could not be performed, the data remained stratified and efficiencies were calculated for each time period.

Trout Exploitation by Canals

I estimated exploitation by releasing tagged trout in the streams in the vicinity of the study canals, expanding the number recaptured in the bypass traps by the trap efficiency estimates, and dividing the results by the number released. Fish were released 100 m upstream of canal L-30A in the Lemhi River, 50 m above canal BSC-5A in Big Springs Creek, and 50 m upstream of canals P-5 and P-8A in the Pahsimeroi River (Figures 1 and 2). The release sites were chosen based on accessibility and the presence of stream features (e.g., riffles) that would help disperse fish across the stream channel. Because trout of different sizes and species may have been unequally vulnerable to interception by the canals, I estimated exploitation by the same length groups and species used to estimate trap efficiency. Fish for the stream release samples were either collected from the bypass traps or by electrofishing. Newly-captured trout were anaesthetized with MS-222, identified to species, measured to nearest mm (FL), PIT-tagged, and transported to the release sites in aerated coolers. Since PIT tags could not be used on fish <60 mm, only fish ≥60 mm FL were used to estimate exploitation. The traps were checked daily for recoveries and recaptured fish were released in the stream below the canal intake. Fish availability largely determined the frequency of the stream releases, but I attempted to release marked groups of fish on a daily basis.

Since fish that entered the canals were not necessarily captured in the bypass traps, I used the trap efficiency data to expand the counts of recovered stream release fish. If the trap efficiency estimates were not significantly different over time, the recapture data were pooled and used to calculate overall expanded recovery and error estimates by length group and species for each canal (Rawson 1984):

$$\hat{N} = \frac{nD}{d}\left[1 + \frac{D-d}{Dd}\right],$$

where $\hat{N}$ = the overall expanded estimate of stream release fish in a length-species group that were recovered; n = the total number of stream release fish in a length-species group that were recovered; *D* = the total number of fish in a length-species group that were marked and released in a canal to estimate trap efficiency; and *d* = the total number of fish recovered from release D. Error estimates were calculated using (Rawson 1984):

$$V[\hat{N}] = n(n+d)\,D\,\frac{(D-d)}{d^3},$$

$$SE[\hat{N}] = \sqrt{V[\hat{N}]}.$$

If the trap efficiency estimates were significantly different over time, the recapture data were stratified and used to calculate expanded recovery and error estimates by time period for

each length-species group. The strata estimates were then summed to obtain overall expanded recovery $\hat{N}$ and variance $V[\hat{N}]$ estimates.

I calculated exploitation by length-species group as: $\hat{N}/M$, where M = the total number of fish in a length-species group that were marked and released in a stream. Error estimates were calculated by treating 1/M as a constant (Lehman 1975):

$$V\left[\frac{\hat{N}}{M}\right] = \left(\frac{1}{M}\right)^2 V[\hat{N}],$$

$$SE\left[\frac{\hat{N}}{M}\right] = \sqrt{V\left[\frac{\hat{N}}{M}\right]}.$$

RESULTS

Bypass Trap Catch

Rainbow trout/steelhead was by far the predominant salmonid species captured in the bypass traps at all sites (Appendices B through G). Chinook salmon and eastern brook trout were the next most prevalent species captured. Low numbers of bull trout and cutthroat trout were also caught at some sites. Based on the length statistics I calculated for the salmonids captured in the bypass traps, YOY and yearling fish dominated the catch (Table 2). Older age classes were conspicuously missing, although a few older fish were captured in canals on all three streams.

Interception of fish ≤75 mm (FL) by the study canals generally occurred from July through the end of the irrigation season (Figures 7, 8, and 9). Fish >75 mm FL tended to enter the canals from May through June, then again from August through the end of the irrigation season (Figures 10, 11, and 12).

Trap Efficiency

I only calculated trap efficiency estimates for rainbow trout/steelhead since release and recovery data for other trout and char species were too few at most sites for consideration. This was also true for rainbow trout/steelhead at the Lemhi River sites. For the Lemhi River canals, the number of releases and recaptures were too low for meaningful efficiency estimates (Tables 3 and 4). The lone exception was the August-October period on L-30 where 32% of rainbow trout/steelhead were recovered.

More release and recovery data were collected at the Big Spring sites (Tables 5 and 6). Still, I needed to stratify most of these data by time period, which resulted in small samples

Table 2. Length statistics for salmonids captured in Lemhi River, Big Springs Creek, and Pahsimeroi River, Idaho fish screen bypass traps, 1997 irrigation season.

Species	n	Range, mm (FL) [a]	Mean, mm (FL)	SD
Lemhi River		**≤75 mm**		
Rainbow trout/steelhead	9	45-73	58	10
Eastern brook trout	2	45-65	55	14
Chinook salmon	1	35	—	—
		>75 mm		
Rainbow trout/steelhead	87	76-320	193	45
Bull trout	50	137-365	206	61
Cutthroat trout	4	215-289	242	32
Chinook salmon	96	95-195	123	24
Big Springs Creek		**≤75 mm**		
Rainbow trout/steelhead	375	25-75	62	9
		>75 mm		
Rainbow trout/steelhead	257	76-315	102	28
Eastern brook trout	7	85-230	116	52
Bull trout	2	117-234	176	83
Pahsimeroi River		**≤75 mm**		
Rainbow trout/steelhead	1,239	31-75	59	11
Eastern brook trout	14	58-75	66	5
Bull trout	1	75	—	—
Chinook salmon	2	66-72	69	4
		>75 mm		
Rainbow trout/steelhead	1,747	76-437	134	44
Eastern brook trout	213	76-285	166	44
Bull trout	2	96-213	155	83
Chinook salmon	408	76-219	105	14

[a] FL = fork length

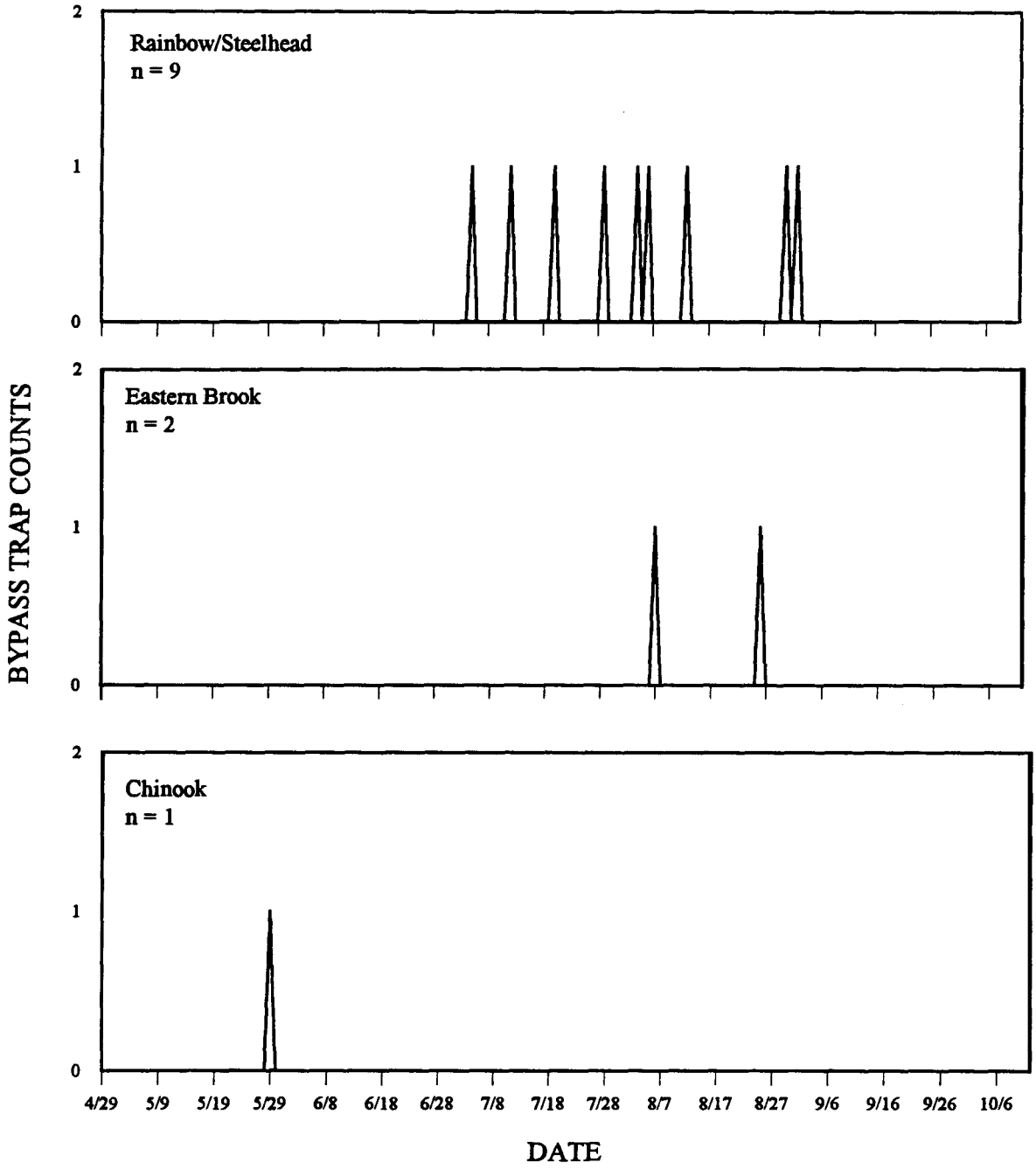

Figure 7. Cumulative catch of salmonids ≤75 mm (FL) captured in Lemhi River, Idaho fish screen bypass traps, 1997 irrigation season. The traps were pulled during a 6/1 to 6/25 flood event.

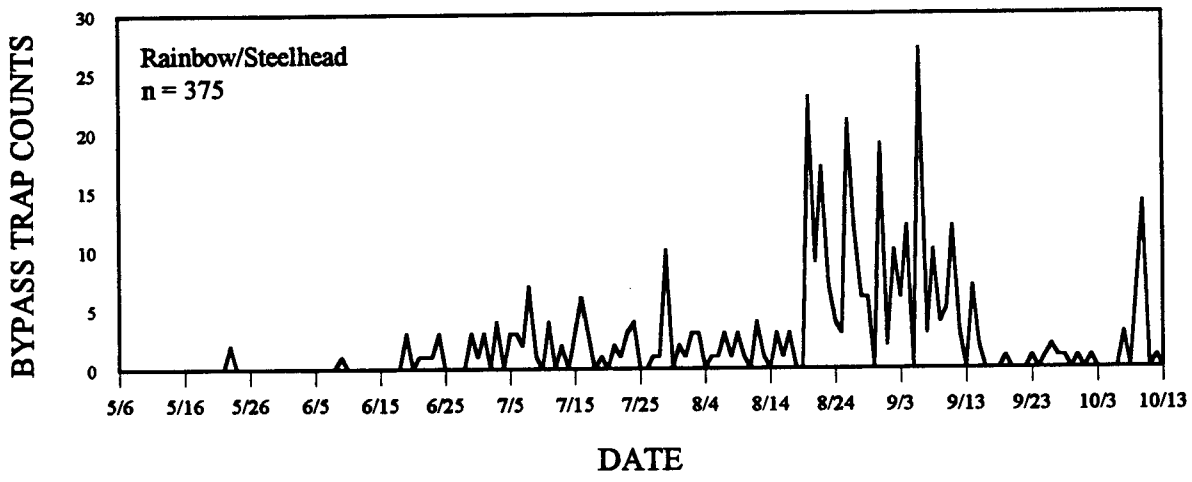

Figure 8. Cumulative catch of salmonids ≤75 mm (FL) captured in Big Springs Creek, Idaho fish screen bypass traps, 1997 irrigation season.

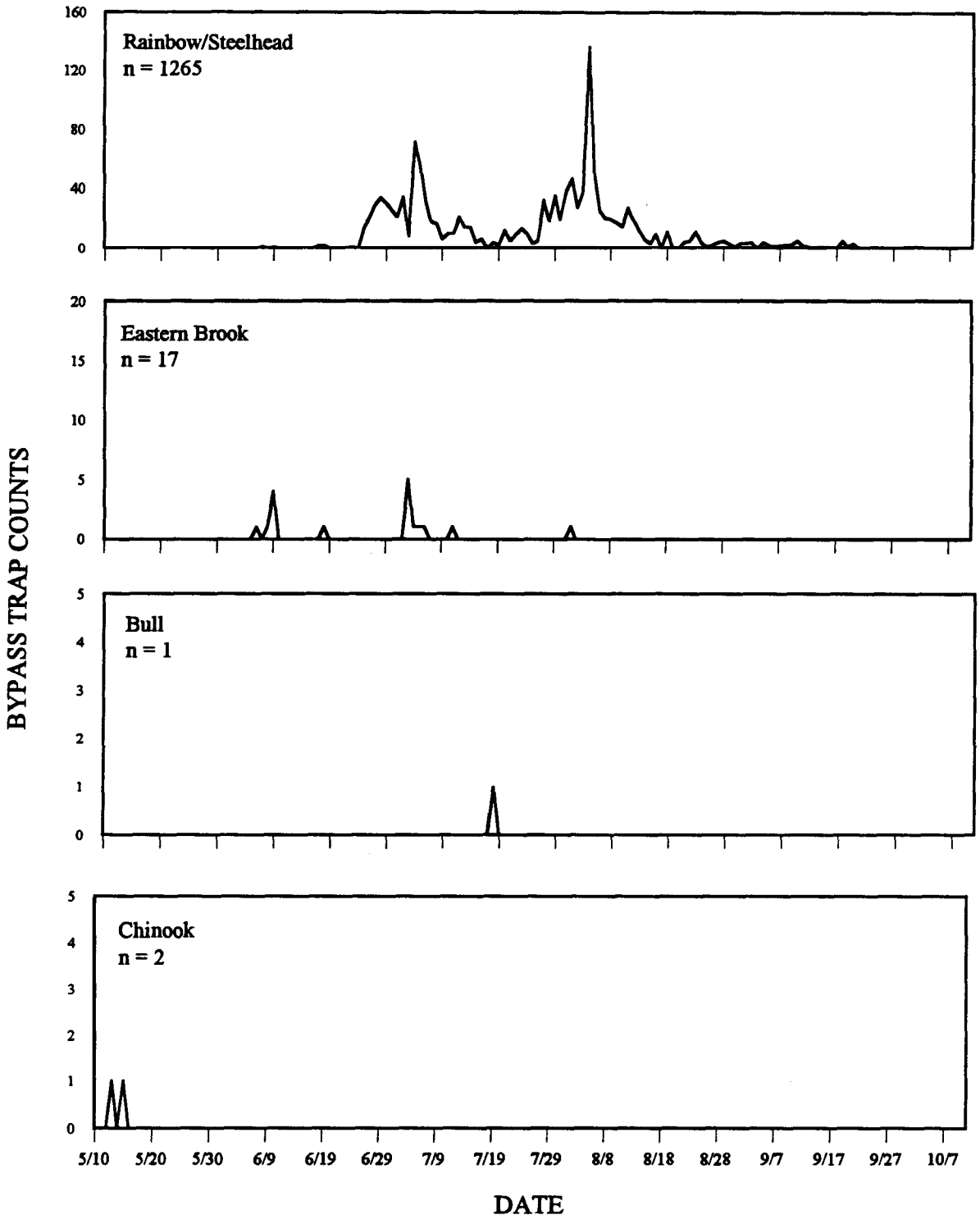

Figure 9. Cumulative catch of salmonids ≤75 mm (FL) captured in Pahsimeroi River, Idaho fish screen bypass traps, 1997 irrigation season.

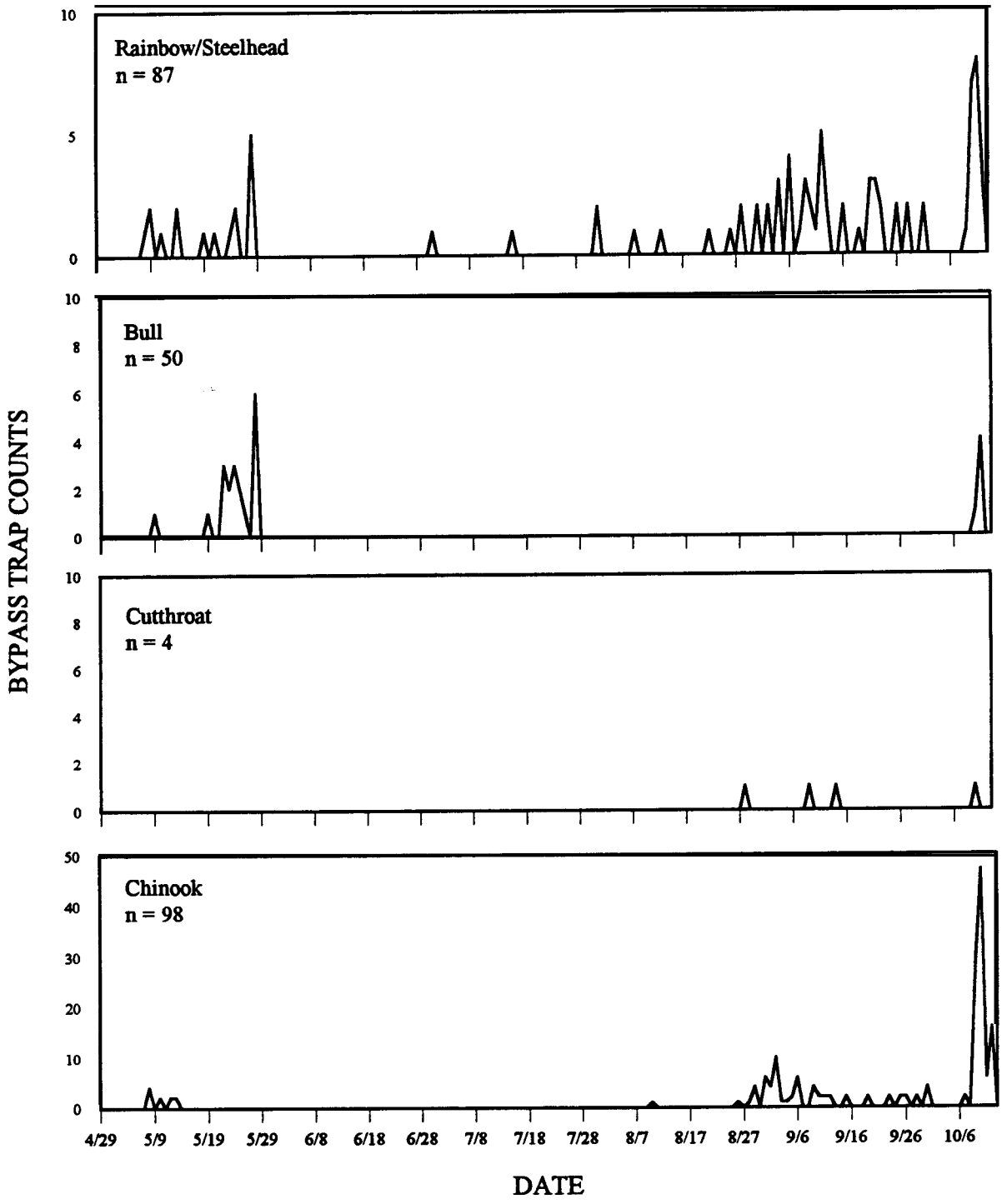

Figure 10. Cumulative catch of salmonids >75 mm (FL) captured in Lemhi River, Idaho fish screen bypass traps, 1997 irrigation season. The traps were pulled during a 6/1 to 6/25 flood event.

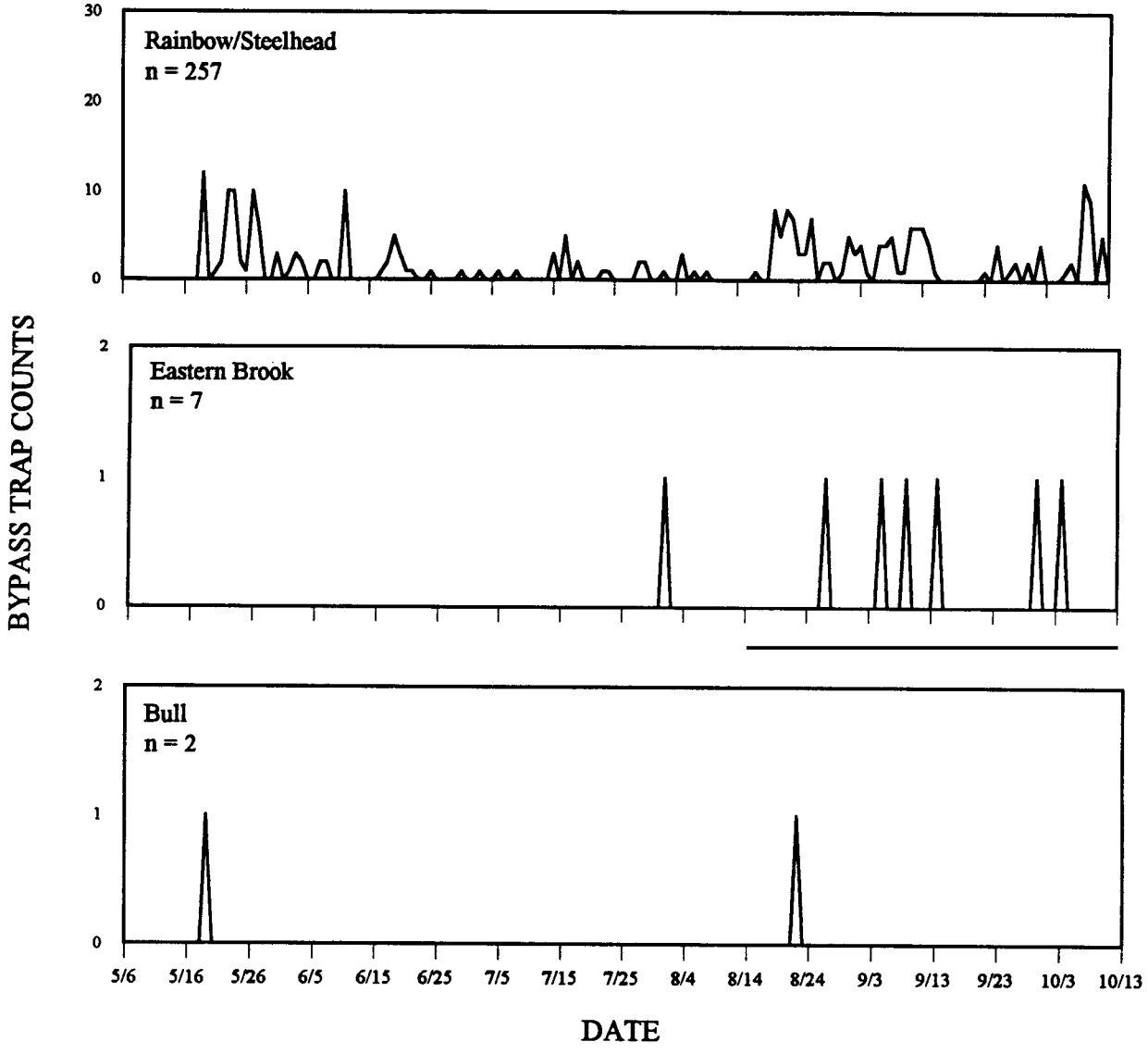

Figure 11. Cumulative catch of salmonids >75 mm (FL) captured in Big Springs Creek, Idaho fish screen bypass traps, 1997 irrigation season.

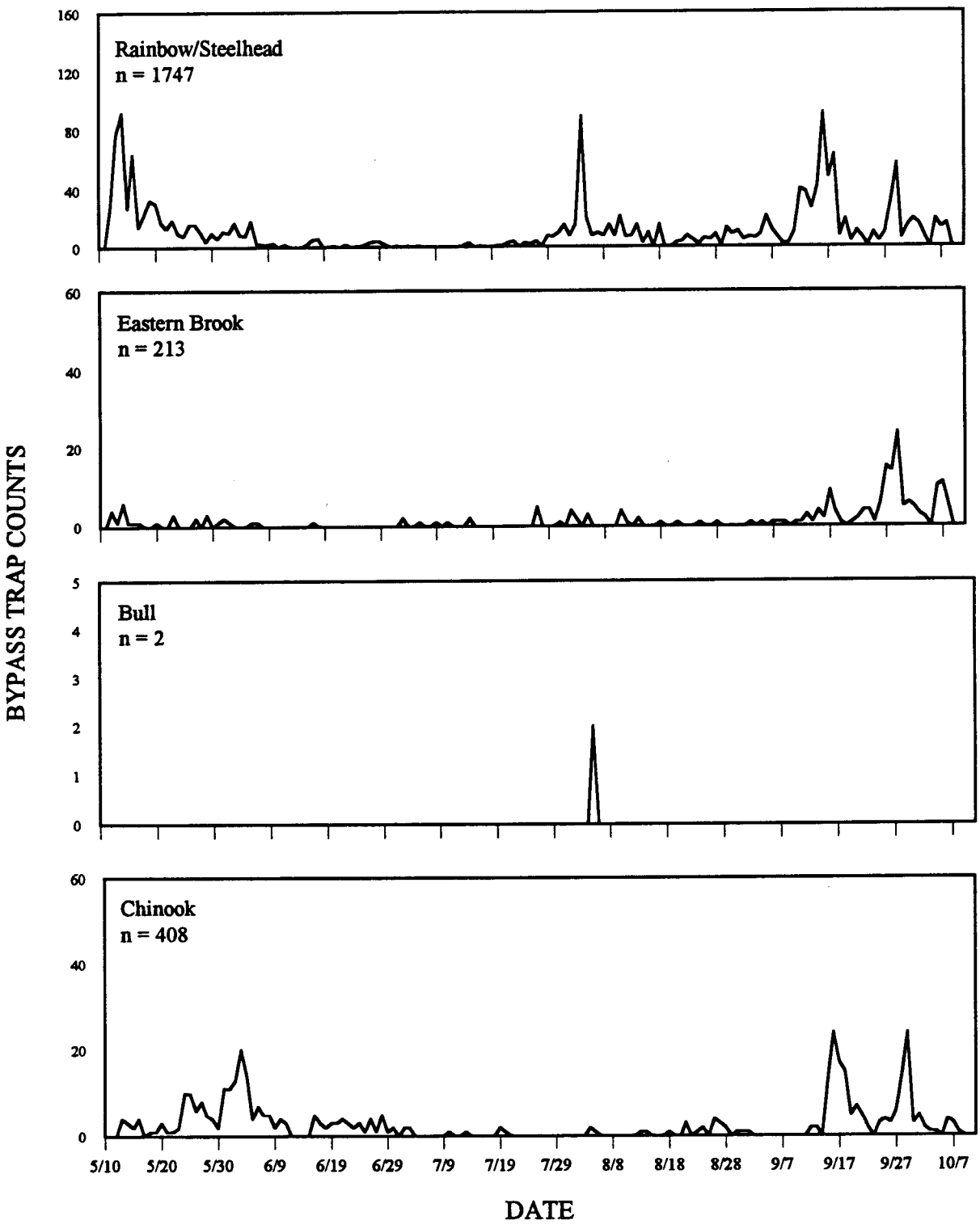

Figure 12. Cumulative catch of salmonids > 75 mm (FL) captured in Pahsimeroi River, Idaho fish screen bypass traps, 1997 irrigation season.

Table 3. Trap efficiency estimates for rainbow trout/steelhead s75 mm (FL) captured in Lemhi River, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency (%)	95% confidence interval (%)	
					Lower	Upper
L-19 [a]	05/20-05/31	0	0	--	–	–
	06/01-06/20	0	0	--	–	–
	06/21-10/10	4	2	50.0	6.8	93.2
L-22 [a]	05/06-06/07	0	0	--	–	–
	06/08-07/09	0	0	--	–	–
	07/10-08/27	2	1	50.0	1.3	98.7
	08/28-10/12	0	0	—	–	–
L-30 [a]	04/49-07/15	0	0	--	---	--
	07/16-08/27	0	0	--	--	--
	08/28-10/12	0	0	--	--	--
L-30[a] [o]	05/08-05/26	0	0	--	--	--
	05/27-06/20	0	0	--	–	--
	06/21-07/12	0	0	--	–	--
	07/13-09/11	2	1	50.0	1.3	98.7

[a] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods.

Table 4. Trap efficiency estimates for rainbow trout/steelhead >75 mm (FL) captured in Lemhi River, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency1%)	95% confidence interval (%) Lower	Upper
L-19 [a]	05/20-05/31	0	0	--	--	--
	06/01-06/20	0	0	--	--	--
	06/21-10/10	0	0	--	--	--
L-22 [a]	05/06-06/07	6	1	16.7	0.42	64.1
	06/08-07/09	1	0	0.0	—	—
	07/10-08/27	2	0	0.0	--	—
	08/28-10/12	4	2	50.0	6.80	93.2
L-30 [a]	04/49-07/15	4	2	50.0	6.80	93.2
	07/16-08/27	3	1	33.3	0.84	90.6
	08/28-10/12	50	16	32.0	19.50	46.7
L-30A [a]	05/08-05/26	0	0	—	--	--
	05/27-06/20	2	0	0.0	--	--
	06/21-07/12	0	0	—	--	--
	07/13-09/11	2	0	0.0	--	--

[a] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods, expected frequencies were <1, or >20% of expected frequencies were <5.

Table 5. Trap efficiency estimates for rainbow troutlsteelhead 75 mm (FL) captured in Big Springs Creek, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency (%)	95% confidence interval (%)	
					Lower	Upper
BSC-3[a]	05/06-06/19	0	0	–	–	–
	06/20-07/16	22	5	22.7	7.80	45.4
	07/17-08/16	8	2	25.0	3.20	65.1
	08/17-10/12	39	9	23.1	11.10	39.3
	06/20-10/12	69	16	23.2	13.90	34.9
BSC-4[b]	05/22-07/13	2	0	0.0	–	–
	07/14-10/12	3	1	33.3	0.84	90.5
BSC-5[b]	05/17-08/05	16	3	18.8	4.00	45.6
	08/06-08/19	1	0	0.0	–	–
	08/20-09/13	64	23	35.9	24.30	48.9
	09/14-10/12	11	1	9.1	0.23	41.3
BSC-5A[b]	05/23-06/28	8	0	0.0	–	–
	06/29-10/12	52	7	13.5	5.60	25.8

[a] Since trap efficiency estimates for the three time periods between 06/20 and 10/12 were not significantly different (x^2 = 0.1, df = 2, P=0.95), the data were pooled and a single estimate was calculated.

[b] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods, expected frequencies were <1, or >20% of expected frequencies were <5.

Table 6. Trap efficiency estimates for rainbow trout/steelhead >75 mm (FL) captured in Big Springs Creek, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency (%)	95% confidence interval (%) Lower	Upper
BSC-3 [a]	05/06-06/19	26	17	65.4	44.30	82.8
	06/20-07/16	6	1	16.7	0.42	64.1
	07/17-08/16	4	3	75.0	19.40	99.4
	08/17-10/12	34	5	14.7	4.90	31.1
BSC-4 [a]	05/22-07/13	21	9	42.9	21.80	66.0
	07/14-10/12	4	1	25.0	0.63	80.6
BSC-5 [a]	05/17-08/05	31	14	45.2	27.30	64.0
	08/06-08/19	2	1	50.0	1.30	98.7
	08/20-09/13	24	13	54.2	32.80	74.4
	09/14-10/12	14	1	7.1	0.18	33.9
BSC-5A [a]	05/23-06/28	5	1	20.0	0.51	71.6
	06/29-10/12	17	6	35.3	14.20	61.7

[a] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods, expected frequencies were <1, or >20% of expected frequencies were <5.

(particularly *d* = trap efficiency recoveries <7) (Seber 1982) and wide confidence intervals for some of the strata estimates. Efficiency estimates for rainbow trout/steelhead s75 mm (FL) ranged from 0% to 36%, and from 7% to 75% for fish >75 mm.

The best release and recovery data were collected at the Pahsimeroi River sites (Tables 7 and 8). Sample sizes were generally large enough for useful efficiency estimates, although I needed to stratify the data by time period for most of the canals, which resulted in *d* <7 for some of the strata. Estimates for rainbow trout/steelhead ≤75 mm (FL) ranged from 0% to 29%, and from 10% to 59% for fish >75 mm.

Trout Exploitation by Canals

I only calculated exploitation estimates for rainbow trout/steelhead since release and recovery data (trap efficiency and/or exploitation) for other trout and char species were too few at most sites for consideration. However, I could not calculate rainbow trout/steelhead exploitation estimates for any of the Lemhi River canals because there were no marked stream released fish recovered (Table 9, Appendix H).

I was able to calculate one exploitation estimate for rainbow trout/steelhead ≤75 mm (FL) (2.1%, canal BSC-5) from the Big Springs Creek data (Table 10, Appendix I). Two estimates ranging from 5% (BSC-5) to 16% (BSC-3) were also calculated for fish >75 mm (FL), for a cumulative rate of 21%. These estimates were based on only a few recaptures of fish that were tagged and released in the stream, but the trap efficiency samples I used to expand the recovery data were adequately large. One exception being the sample from canal BSC-3 for fish >75 mm (FL) (Appendix I, *d* = 5).

Since rainbow trout/steelhead were tagged and released in the stream at two sites on the Pahsimeroi River (above P-5 and P-8A), I evaluated the release and recovery data to determine if there was mixing between the two release groups. For fish s75 mm (FL), none of those released above P-8A were recaptured in any of the bypass traps (Table 11), so I omitted these fish from the analyses. There did appear to be some mixing between fish >75 mm (FL) released at the two sites (Table 11), so I included all of these fish in the analyses. I was able to calculate one exploitation estimate for fish ≤75 mm (FL) (26%, P-5), and four estimates ranging from 2% (canals P-7 and P-8A) to 43% (canal P-5) for fish >75 mm (FL). A cumulative rate of 50% was estimated for fish >75 mm (FL) (Table 12, Appendix J). Although *d* < 7 occurred in some of the strata, I judge the overall quality of these estimates to be good based on the number of trap efficiency recoveries (Appendix J).

Overall, the fish that were recaptured at the Big Springs Creek and Pahsimeroi River sites were larger than the fish that were released (Table 13, Figure 13). Few rainbow trout/steelhead ≤75 mm (FL) were recaptured in canals on Big Springs Creek (2 of 279 released) and the Pahsimeroi River (7 of 348 released), and fish >75 mm (FL) were generally not recaptured at the Big Springs Creek sites (7 of 151 released).

The time that elapsed between the release of chinook salmon in the streams and recapture in the bypass traps ranged from one to four days on the Lemhi River and one to 17 days on the Pahsimeroi River. Most of the fish I released were recaptured within one or two days, and there was only one instance of a fish being recaptured twice (Table 14). These fish seemed to be actively migrating, based on the time they were first captured and tagged (Figures 7, 9, 10, and 12) and their size (Table 15).

Table 7. Trap efficiency estimates for rainbow trout /steelhead s75 mm (FL) captured in Pahsimeroi River, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency (%)	95% confidence interval (%) Lower	Upper
P-3 [a]	05/10-08/01	75	8	10.7	4.7	19.9
	08/02-10/04	6	0	0.0	—	—
P-4	06/19-09/01	83	24	28.9	19.5	39.9
	09/02-10/03	0	0	—	—	—
P-5 [a]	05/10-07/09	5	0	0.0	—	—
	07/10-09/04	94	7	7.4	3.0	14.7
	09/05-09/20	10	0	0.0	—	—
	09/21-10/10	0	0	—	—	—
P-7 [a]	05/13-06/13	0	0	—	—	—
	06/14-07/27	8	2	25.0	3.2	65.1
	07/28-10/10	52	14	26.9	15.5	41.0
P-8A [a]	05/12-09/12	13	0	0.0	--	--

[a] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods, expected frequencies were <1, or >20% of expected frequencies were <5.

Table 8. Trap efficiency estimates for rainbow trout/steelhead >75 mm (FL) captured in Pahsimeroi River, Idaho fish screen bypass traps, 1997 irrigation season.

Canal	Dates	Number of releases *(D)*	Number of recoveries *(d)*	Efficiency (%)	95% confidence interval (%)	
					Lower	Upper
P-3[a]	05/10-08/01	40	11	27.5	14.6	43.9
	08/02-10/04	19	3	15.8	3.4	39.6
P-4[a]	06/19-09/01	37	6	16.2	6.2	32.0
	09/02-10/03	0	0	--	--	--
P-5[b]	05/10-07/09	83	45	54.2	42.9	65.2
	07/10-09/04	52	5	9.6	3.1	21.0
	09/05-09/20	30	11	36.7	19.9	56.1
	09/21-10/10	60	19	31.7	20.2	45.0
P-7[c]	05/13-06/13	59	35	59.3	45.7	71.9
	06/14-07/27	21	5	23.8	8.2	47.2
	07/28-10/10	149	69	46.3	38.1	54.7
	Overall	229	109	47.6	41.0	54.3
P-8A[a]	05/12-09/12	43	18	41.9	27.0	57.9

[a] Chi-square contingency tests were not performed to determine whether trap efficiency estimates differed by time period since data were available for one or less time periods, expected frequencies were <1, or >20% of expected frequencies were <5.

[b] Since trap efficiency estimates for the four time periods were significantly different ($x^2 = 14.45$, df = 3, $P < 0.01$), the data were stratified and estimates were calculated for each period.

° Since trap efficiency estimates for the three time periods were not significantly different ($X^2 = 3.12$, df = 2, $0.10 < P < 0.25$), the data were pooled and an overall estimate was calculated.

Table 9. Exploitation estimates by length group for rainbow trout/steelhead (RBT/SH) intercepted by irrigation diversions on the Lemhi River, Idaho, 1997 irrigation season.

Canal	Dates	Marked stream releases recovered (n)	Expanded stream release recoveries ($\hat{N}$)	Trout exploitation rate SE [$\hat{N}$]	($\hat{N}$/ M)	SE [$\hat{N}$ /M]
≤75 mm[a] (FL)						
L-19	05/20-10/10	0	--	--	--	--
L-22	05/06-10/12	0	--	--	--	--
L-30	04/29-10/12	0	--	--	--	--
L-30A	05/08-09/11	0	--	--	--	--
>75 mm[b] (FL)						
L-19	05/20-10/10	0	--	--	--	--
L-22	05/06-10/12	0	--	--	--	--
L-30	04/29-10/12	0	--	--	--	--
L-30A	05/08-09/11	0	--	--	--	--

[a] No RBT/SH ≤75 mm were marked and released = M.
[b] Eight RBT/SH >75 mm were marked and released = M.

Table 10. Exploitation estimates by length group for rainbow trout/steelhead (RBT/SH) intercepted by irrigation diversions on Big Springs Creek, Idaho, 1997 irrigation season.

Canal	Dates	Marked stream releases recovered (n)	Expanded stream release recoveries ($\hat{N}$)	Trout exploitation rate SE [$\hat{N}$]	($\hat{N}$/ M)	SE [$\hat{N}$ /M]
≤75 mm[a] (FL)						
BSC-3	05/06-10/12	0	0	--	--	--
BSC-4	06/22-10/12	0	0	--	--	--
BSC-5[b]	05/17-10/12	2	6	3	0.021	0.012
BSC-5A	05/23-10/12	0	0	--	--	--
>75 mm[c] (FL)						
BSC-3[b]	05/06-10/12	3	24	14	0.158	0.091
BSC-4	06/22-10/12	0	0	--	--	--
BSC-5[b]	05/17-10/12	4	8	3	0.053	0.019
BSC-5A	05/23-10/12	0	0	--	--	--
Cumulative	05/17-10/12	7	32	14	0.211	0.093

[a] Two hundred seventy-nine RBT/SH ≤75 mm were marked and released = M.

[b] Since the trap efficiency estimates used to expand the recovery data either differed by time period or could not be analyzed with chi-square contigency tests, the recovery data were stratified by time period. The $\hat{N}$ estimates presented here are the sums of strata estimates, with standard errors calculated as the square root of the sums of the associated variance estimates.

[c] One hundred fifty-one RBT/SH >75 mm were marked and released = M.

Table 11. Actual numbers of rainbow trout/steelhead (RBT/SH) recovered by length group, release area, and recapture area, Pahsimeroi River, Idaho, 1997 irrigation season. PIT-tagged fish were released in the river above canals P-5 and P-8A and recaptured in fish screen bypass traps to estimate exploitation of trout by irrigation diversions.

Release area	Recapture area				
	P-3	P-4	P-5	P-7	P-8A
≤75 mm[a](FL)					
Above P-5	0	0	7	0	0
Above P-8A	0	0	0	0	0
>75 mm [b] (FL)					
Above P-5	0	6	198	0	0
Above P-8A	0	0	3	8	9

[a] Three hundred forty-five and 87 RBT/SH ≤75 mm (FL) were released above canals P-5 and P-8A, respectively.

[b] Eight hundred fifty-two and 304 RBT/SH >75 mm (FL) were released above canals P-5 and P-8A, respectively.

Table 12 . Exploitation estimates by length group for rainbow/steelhead trout (RBT/SH) intercepted by irrigation diversions on the Pahsimeroi River, Idaho, 1997 irrigation season.

Canal	Dates	Marked stream releases recovered (n)	Expanded stream release recoveries (N)	Trout exploitation rate		
				SE [S^r]	(N/ M)	SE [N/M]
≤75 mm (FL)						
P-3	05/10-10/04	0	0	—	—	—
P-4	06/19-10/03	0	0	—	—	—
P-5[b]	05/10-10/10	6	91	43	0.264	0.124
P-7	05/13-10/10	0	0	—	—	—
P-8A	05/12-09/12	0	0	—	—	—
>75 mm (FL)						
P-3[b]	05/10-10/04	0	0	—	_	—
P-4[b]	06/19-10/03	6	42	20	0.037	0.017
P-5[b]	05/10-10/10	201	501	61	0.434	0.053
P-7[d]	05/13-10/10	8	17	4	0.015	0.004
P-8A[b]	05/12-09/12	9	22	7	0.019	0.006
Cumulative	05/10-10/10	224	582	64	0.504	0.056

[a] Three hundred forty-five RBT/SH s75 mm were marked and released above P-5 = M. An additional 87 RBT/SH s75 mm released above P-8A were not included in the analyses.

[b] Since the trap efficiency estimates used to expand the recovery data either differed by time period or could not be analyzed with chi-square contigency tests, the recovery data were stratified by time period. The estimates presented here are the sums of strata estimates, with standard errors calculated as the square root of the sums of the associated variance estimates.

[c] One thousand one hundred fifty-five RBT/SH >75 mm were marked and released = M.

[d] Since the trap efficiency estimates used to expand the recovery data did not differ over time, the recovery data were pooled to calculate an overall N estimate and its standard error.

Table 13 . Length statistics for rainbow/steelhead trout released in the streams and recaptured in fish screen bypass traps on Big Springs Creek and the Pahsimeroi River, Idaho, 1997 irrigation season.

Species	n	Range. mm (FL)[a]	Mean. mm (FL)	SD
Big Springs Creek		≤75 mm		
Release	279	44-75	62	7
Recapture	2	62-73	68	8
		>75mm		
Release	149	76-224	121	44
Recapture	5	83-115	101	13
		Overall		
Release	428	44-224	82	39
Recapture	7	62-115	92	20
Pahsimeroi		≤75 mm		
Release	344	52-75	67	5
Recapture	6	60-75	68	5
		>75 mm		
Release	1,084	76-437	131	43
Recapture	156	80-262	156	36
		Overall		
Release	1,428	52-437	116	47
Recapture	162	60-262	153	39

[a] FL = fork length.

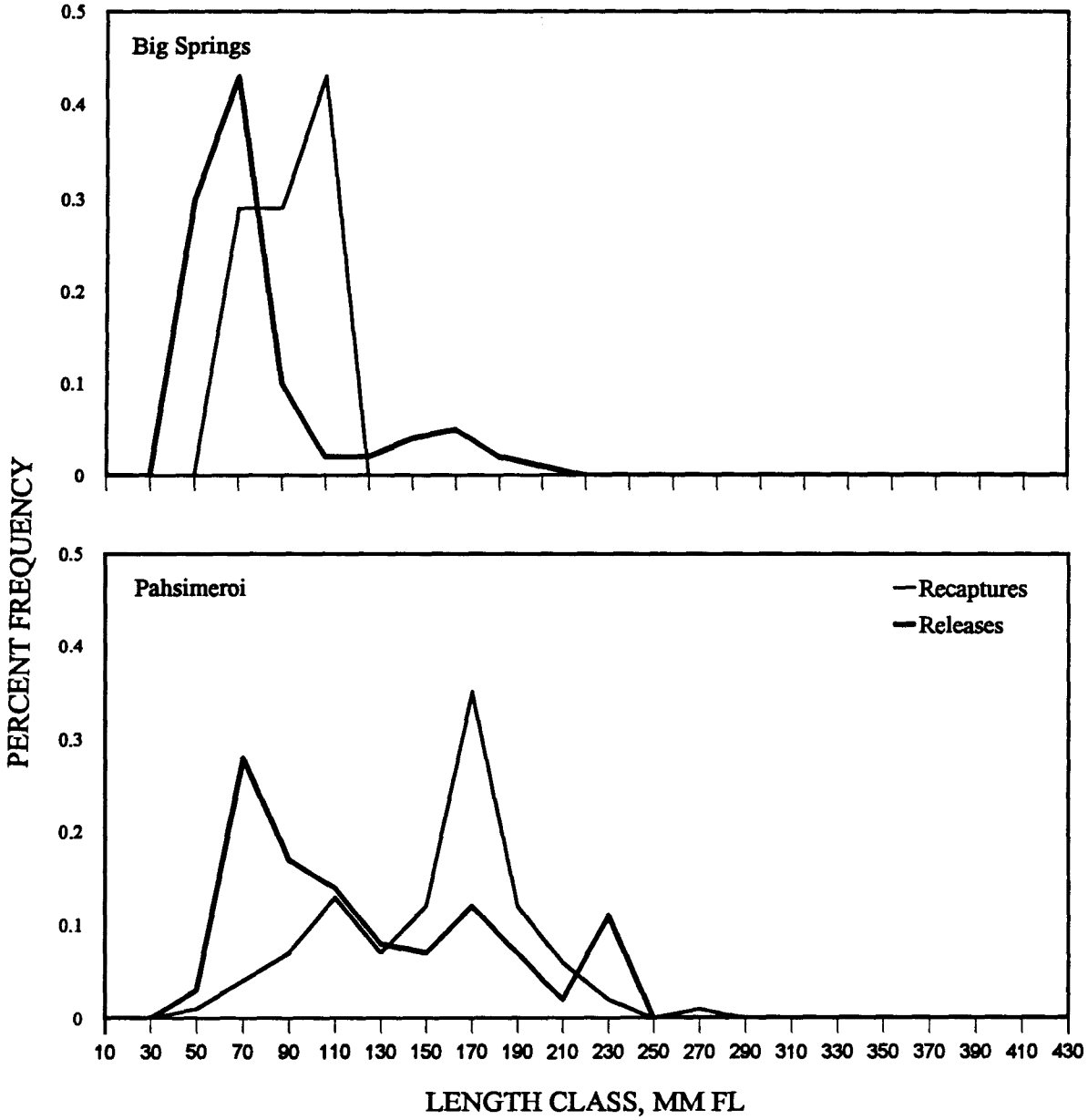

Figure 13. Length frequency distributions of rainbow trout/steelhead released in the streams and recaptured in fish screen bypass traps on Big Springs Creek and the Pahsimeroi River, Idaho, 1997 irrigation season. X-axis labels are class marks of 20 mm length classes. Lengths were measured in mm (FL).

Table 14. Elapsed time in days between release of chinook salmon in streams and recapture in fish screen bypass traps on the Lemhi and Pahsimeroi rivers, Idaho, 1997 irrigation season.

	Days between release and recapture								
	1	2	3	4	5	6	7	8	17
Lemhi [a]									
Recaptured 1x	7	–	2	1	--	--	--	--	--
Pahsimeroi [b]									
Recaptured 1x	19	7	4	2	—	1	1	2	1
Recaptured 2x °	—	–	—	—	1	–	–	--	--

[a] Forty-seven chinook salmon were released and 10 were recaptured one time (1x). All fish were recaptured in the canal immediately downstream of the release site.

[b] Three hundred thirty-six chinook salmon were released; 37 were recaptured one time (1x) and one was recaptured twice (2x). All fish were recaptured in the canal immediately below the release site except for eight fish that were caught farther downstream.

[c] This fish was recaptured twice in five days in different canals (P-8A on 5/31 and P-5 on 6/4).

Table 15. Length statistics for chinook salmon released in the streams and recaptured in fish screen bypass traps on the Lemhi and Pahsimeroi rivers, Idaho, 1997 irrigation season.

Species	n	Range. mm (FL) [a]	Mean. mm (FL)	SD
Lemhi				
Release	44	95-195	134	30
Recapture	7	103-195	143	35
Pahsimeroi				
Release	327	77-219	108	14
Recapture	29	85-112	98	7

[a] FL = fork length.

DISCUSSION

Emigration of marked fish from the canals may have biased my efficiency and hence exploitation estimates. Reiland (1997) reported age 1+ brown trout marked in canals in Montana were captured by anglers in the adjacent river, thus documenting fish emigration from canals. If marked fish emigrated from the canals prior to recapture then trap efficiency and non-weighted exploitation estimates would be underestimated. If the marked fish used to estimate trap efficiency had a higher rate of emigration from the canals than the marked fish used to estimate exploitation, then the weighted exploitation estimate would be inflated. However, if all marked fish had an equal rate of emigration from the canal then the weighted exploitation estimate would be unchanged. I did not investigate the emigration rate of marked fish from the canals in this study, but I assumed all marked fish had equal emigration rates.

Exploitation estimates for rainbow trout ≤75 mm (FL) ranged from 2% to 26% (mean = 14%, n = 2), and from 2% to 43% (mean = 12%, n = 6) for fish >75 mm (FL). Although the exploitation rates for some of the canals were relatively low, cumulative rates could be high. For instance, the cumulative exploitation rate for fish >75 mm (FL) by four canals sampled on the Pahsimeroi River was 50%. This suggests the impact of multiple diversions on a population could be extreme.

Although I could not calculate exploitation estimates for several canals on the Lemhi River, Big Springs Creek, and the Pahsimeroi River, this does not imply they failed to intercept fish. Indeed, all of the canals caught one age class or another of some salmonid species (Appendices B through G). Further, the exploitation estimates I did calculate were germane to only a few time strata in a couple of instances because stream-released fish were only recovered during a few time periods, or trap efficiency data were not available to expand the number of recaptures. Fish may have been intercepted during other periods, but sufficient efficiency or exploitation estimates were absent. For example, the exploitation estimate for rainbow trout/steelhead ≤75 mm (FL) intercepted by canal BSC-5 on Big Springs Creek was based on data collected from August 20 through September 13 (Appendix I). Although most fish of this size were captured during this time period, a few were also caught at other times when efficiency or exploitation estimates could not be calculated (Appendix D).

Overall, the fish that were recaptured at the Big Springs Creek and Pahsimeroi River sites for estimating exploitation were larger than the fish that were released (Table 13, Figure 13). I attribute this to growth since YOY and yearling fish were predominant in stream release samples. Three rainbow trout/steelhead >75 mm (FL) that were recaptured at the Pahsimeroi River sites were recruited from the s75 mm (FL) length group. These fish were not included in the analyses for fish ≤75 mm (FL), but other fish from the ≤75 mm (FL) release group M probably recruited into the >75 mm (FL) length group. The estimate for this length group (canal P-5) should therefore be regarded as a minimum. Growth recruitment of fish from the ≤75 mm (FL) into the >75 mm (FL) length group was not detected at the Big Springs Creek sites.

Few rainbow trout/steelhead ≤75 mm (FL) were recaptured in canals on Big Springs Creek (2 of 279 released) and the Pahsimeroi River (7 of 348 released), and fish >75 mm (FL) were generally not recaptured at the Big Springs Creek sites (7 of 151 released). Although there are several explanations for these observations (e.g., growth recruitment, emigration out of the study area, trap avoidance), signs of whirling disease were detected among these fish. At Big Springs Creek, 7.4% (22/298) of fish ≤75 mm (FL) collected between July 16 and September 26 and 3.1% (4/131) of fish >75 mm (FL) collected between July 16 and October 2 were symptomatic. At the Pahsimeroi River, 8.1% (60/738) of fish ≤75 mm (FL) collected between July 18 and September 6 and 6.5% (86/1315) of fish >75 mm (FL) collected between May 23 and October 8 had signs of the

disease. These rates are not alarmingly high, but they suggest that some of the fish that were tagged and released were diseased and could have died. This would produce low recapture rates and exploitation estimates.

Older age classes were typically not represented in the bypass trap catches (Table 2). The orifice slide gates (Figure 3) may have discouraged older, larger fish from entering the bypasses, but the snorkel surveys I conducted in August suggested that the fish populations around the study canals were composed mostly of younger fish (Appendix K). Younger rainbow trout/steelhead (n = 243, range = 50 mm to 224 mm [FL], mean = 89 mm [FL], SD = 47) were also captured during July electroshocking operations on Big Springs Creek. Although older age classes may have been present in the streams in larger numbers at other times during the irrigation season, it seems they were not captured any less frequently than they appeared in the populations around the study canals.

Bypass trap catches at the Lemhi River sites were low (Appendices B and C). However, I only observed a few fish around the study canals during the August snorkel surveys (Appendix K), and no fish were captured during electroshocking operations in July. So again, the trap catch appeared to be a reflection of fish populations in the vicinity of the study canals.

I opted to investigate the fish losses in the Pahsimeroi River, Lemhi River, and Big Springs because the screened diversions would allow us to trap more canals with limited manpower. Our hope was to be able to trap larger numbers of resident salmonids while taking advantage of the assistance of available manpower. Fewer resident fish were trapped than we anticipated, therefore, I recommend conducting the same research in an area with high resident fish densities.

RECOMMENDATIONS

1. Continue to estimate trout exploitation rates for a variety of canals in river systems with high resident fish densities.

2. Continue to uniquely mark all fish released for trap efficiency and trout exploitation estimation.

3. Document the movement of fish within canals during the irrigation season, and during canal closures (radio telemetry).

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Travis Horton, Tom Alworth, John Amberg, Dave Potter, Steve Warren, and Kevin Kramer were invaluable in the field. Their perseverance and dedication to detail helped to ensure the data they collected were complete and accurate. I should also mention that even though trapping operations on Rapid River were terminated, Chris Restall, Rick Lowell, and the Rapid River Fish Hatchery crew helped keep things running while we were still afloat. Doug Nemeth, Jerry Lockhart, and Alan Byrne supplied me with the PIT tags, manpower, and technical assistance crucial to this year's operation. Tom Curet and Pat Marcuson provided critical logistical support, materials, equipment, and most importantly, their time. Larry Weeks and Tom Curet secured permission to work in all of the canals, the significance of which cannot be underestimated. Gary Bertellotti and Doug Engemann let me invade their turf at the Pahsimeroi Fish Hatchery and loaned me their help and an occasional tool. Chris Downs, Melo Maiolie, and Dan Schill provided thoughtful reviews of this manuscript. Their comments and suggestions were indispensable. Finally, without the cooperation of the ranchers, this year's work would not have happened. Thanks to all.

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A P P E N D I C E S

Appendix A. Physical characteristics of canals on the Lemhi River, Big Springs Creek, and the Pahsimeroi River, Idaho, 1997 irrigation season [a]

Diversion	River dewatered	Headgate location/ kind	Diversion dam	Drop structure (m)	Relation to river	Decreed m^3/s [b]	Velocity (m/s)	Gradient (%)	Width (m)	Depth (m)	Canal angle
Lemhi River											
L-19	N	river/vertical	N	N	straight	0.57	0.35	-1.0	1.7	0.22	55
L-22	N	river/vertical	Y	N	outside bend	13.39	0.74	-0.5	4.3	0.43	47
L-30	N	canal/vertical	Y	N	outside bend	21.29	0.54	-1.0	5.8	0.39	30
L-30A	N	river/vertical	Y	N	straight	0.67	0.70	-0.5	1.6	0.25	10
Big Springs Creek											
BSC-3	N	river/vertical	Y	N	inside bend	1.04	0.66	-0.5	3.2	0.28	35
BSC-4	N	none	Y	N	straight	1.15	0.63	-1.0	1.1	0.28	75
BSC-5	N	river/vertical	Y	N	outside bend	4.20	0.71	-1.0	2.9	0.20	55
BSC-5A	N	none	Y	N	outside bend	0.50	0.40	-0.5	2.4	0.26	25
Pahsimeroi River											
P-3	N	canal/vertical	Y	N	straight	6.94	0.48	-1.0	4.3	0.08	45
P-4	N	canal/vertical	Y	N	outside bend	5.35	0.34	-0.5	3.1	0.40	60
P-5	N	river/vertical	Y	N	outside bend	18.79	0.35	-0.5	4.0	0.50	98
P-7	N	canal/vertical	Y	N	outside bend	1.03	0.47	-0.5	4.3	0.39	37
P-8A	N	river/vertical	Y	N	outside bend	5.50	0.39	-1.0	2.2	0.21	85

[a] See Der Hovanisian 1997 for methods and definitions.

[b] Water right information obtained from the Idaho Department of Water Resources, Salmon, Idaho.

Appendix B. Catch of rainbow trout/steelhead (RBTISH) and eastern brook trout (EB), and chinook salmon (CHIN) s75 mm (FL) in canals on the Lemhi River, Idaho, 1997 irrigation season. Dashes (--) represent periods of canal closure or flood events.

	Canals					
	L-19		L-22	L-30	L-30A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	RBT/SH	CHIN
04/29	-	-	-	0	-	-
04/30	-	-	-	0	-	-
05/01	-	-	-	0	-	-
05/02	-	-	-	0	-	-
05/03	-	-	-	0	-	-
05/04	-	-	-	0	-	-
05/05	-	-	-	0	-	-
05/06	-	-	0	0	-	-
05/07	-	-	0	0	-	-
05/08	-	-	0	0	0	0
05/09	-	-	0	0	0	0
05/10	-	-	0	0	0	0
05/11	-	-	0	0	0	0
05/12	-	-	0	0	0	0
05/13	-	-	0	0	0	0
05/14	-	-	0	0	0	0
05/15	-	-	0	0	0	0
05/16	-	-	0	0	0	0
05/17	-	-	0	0	0	0
05/18	-	-	0	0	0	0
05/19	-	-	0	0	0	0
05/20	0	0	0	0	0	0
05/21	0	0	0	0	0	0
05/22	0	0	0	0	0	0
05/23	0	0	0	0	0	0
05/24	0	0	0	0	0	0
05/25	0	0	0	0	0	0
05/26	0	0	0	0	0	0
05/27	0	0	0	0	0	0
05/28	0	0	0	0	0	0
05/29	0	0	0	0	0	1
05/30	0	0	0	0	0	0
05/31	0	0	0	0	0	0
06/01	-	-	0	-	-	-
06/02	-	-	-	-	-	-
06/03	-	-	-	-	-	-
06/04	-	-	-	-	-	-
06/05	-	-	-	-	-	-
06/06	-	-	-	-	-	-
06/07	-	-	-	-	-	-
06/08	-	-	-	-	-	-
06/09	-	-	-	-	-	-

Appendix B. Continued.

	Canals					
	L-19		L-22	L-30	L-30A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	RBT/SH	CHIN
06/10	--	--	--	--	--	--
06/11	--	--	--	--	--	--
06/12	--	--	--	--	--	--
06/13	--	--	--	--	--	--
06/14	--	--	--	--	--	--
06/15	--	--	--	--	--	--
06/16	--	--	--	--	--	--
06/17	--	--	--	--	--	--
06/18	--	--	--	--	--	--
06/19	--	--	--	--	--	--
06/20	--	--	--	--	--	--
06/21	--	--	--	--	--	--
06/22	--	--	--	--	--	--
06/23	--	--	--	--	--	--
06/24	--	--	--	--	--	--
06/25	--	--	0	0	0	0
06/26	0	0	0	0	0	0
06/27	0	0	0	0	0	0
06/28	0	0	0	0	0	0
06/29	0	0	0	0	0	0
06/30	0	0	0	0	0	0
07/01	0	0	0	0	0	0
07/02	0	0	0	0	0	0
07/03	0	0	0	0	0	0
07/04	0	0	0	0	0	0
07/05	0	0	0	0	0	0
07/06	0	0	0	0	0	0
07/07	0	0	0	0	0	0
07/08	0	0	0	0	0	0
07/09	0	0	0	0	0	0
07/10	0	0	0	0	0	0
07/11	0	0	0	0	0	0
07/12	0	0	1	0	0	0
07/13	0	0	0	0	--	--
07/14	0	0	0	0	--	--
07/15	0	0	0	0	--	--
07/16	0	0	0	0	--	--
07/18	0	0	0	0	--	--
07/19	0	0	0	0	--	--
07/20	0	0	0	0	--	--
07/21	0	0	0	0	--	--
07/22	0	0	0	0	--	--
07/23	0	0	0	0	--	--
07/24	0	0	0	0	--	--

Appendix B. Continued.

	Canals					
	L-19		L-22	L-30	L-30A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	RBT/SH	CHIN
07/25	0	0	0	0	--	--
07/26	0	0	0	0	--	--
07/27	0	0	0	0	--	--
07/28	0	0	0	0	--	--
07/29	1	0	0	0	--	--
07/30	0	0	0	0	--	--
07/31	0	0	0	0	--	--
08/01	0	0	0	0	--	--
08/02	0	0	0	0	--	--
08/03	0	0	0	0	--	--
08/04	0	0	0	1	--	--
08/05	0	0	0	0	--	--
08/06	1	0	0	0	--	--
08/07	0	1	0	0	--	--
08/08	0	0	0	0	--	--
08/09	0	0	0	0	--	--
08/10	0	0	0	0	--	--
08/11	0	0	0	0	0	0
08/12	0	0	0	0	0	0
08/13	0	0	0	0	0	0
08/14	0	0	0	0	0	0
08/15	0	0	0	0	0	0
08/16	0	0	0	0	0	0
08/17	0	0	0	0	0	0
08/18	0	0	0	0	0	0
08/19	0	0	0	0	0	0
08/20	0	0	0	0	0	0
08/21	0	0	0	0	0	0
08/22	0	0	0	0	0	0
08/23	0	0	0	0	0	0
08/24	0	0	0	0	0	0
08/25	0	0	0	0	0	0
08/26	0	1	0	0	0	0
08/27	0	0	0	0	0	0
08/28	0	0	0	0	0	0
08/29	0	0	0	0	0	0
08/30	0	0	0	0	0	0
08/31	0	0	0	0	1	0
09/01	0	0	0	0	0	0
09/02	0	0	0	0	1	0
09/03	0	0	0	0	0	0
09/04	0	0	0	0	0	0
09/05	0	0	0	0	0	0
09/06	0	0	0	0	0	0

Appendix B. Continued.

	Canals					
	L-19		L 22	L-30	L-30A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	RBT/SH	CHIN
09/07	0	0	0	0	0	0
09/08	0	0	0	0	0	0
09/09	0	0	0	0	0	0
09/10	0	0	0	0	0	0
09/11	0	0	0	0	0	0
09/12	0	0	0	0	0	0
09/13	0	0	0	0	0	0
09/14	0	0	0	0	0	0
09/15	0	0	0	0	0	0
09/16	0	0	0	0	0	0
09/17	0	0	0	0	0	0
09/18	0	0	0	0	0	0
09/19	0	0	0	0	0	0
09/20	0	0	0	0	0	0
09/21	0	0	0	0	0	0
09/22	0	0	0	0	0	0
09/23	0	0	0	0	0	0
09/24	0	0	0	0	0	0
09/25	0	0	0	0	0	0
09/26	0	0	0	0	0	0
09/27	0	0	0	0	0	0
09/28	0	0	0	0	0	0
09/29	0	0	0	0	0	0
09/30	0	0	0	0	0	0
10/01	0	0	0	0	0	0
10/02	0	0	0	0	0	0
10/03	0	0	0	0	0	0
10/04	0	0	—	0	0	0
10/05	0	0	—	0	0	0
10/06	0	0	—	0	0	0
10/07	0	0	—	0	0	0
10/08	0	0	—	0	0	0
10/09	0	0	—	0	0	0
10/10	0	0	0	0	0	0
10/11	0	0	0	0	0	0
10/12	0	0	0	0	0	0
Total	4	2	2	1	2	1

Appendix C. Catch of rainbow trout /steelhead (RBT/SH), bull trout (BT), and cutthroat trout (CT), and chinook salmon (CHIN) >75 mm (FL) in canals on the Lemhi River, Idaho, 1997 irrigation season. Dashes (—) represent periods of canal closure or flood events.

	Canals										
	L-22 .				L-30				L-30A		
Date	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CHIN
04/29	--	--	--	--	0	0	0	0	—	—	—
04/30	--0	--	--	--	0	0	0	0	—	—	—
05/01	--0	--	--	--	0	0	0	0	—	—	—
05/02	--0	--	--	--	0	0	0	0	—	—	—
05/03	--0	--	--	--	0	0	0	0	—	—	—
05/04	--0	--	--	--	0	0	0	0	—	—	—
05/05	--0	--	--	--	0	0	0	0	—	—	—
05/06	0	0	0	0	0	0	0	0	—	—	—
05/07	0	0	0	0	0	0	0	0	—	—	—
05/08	1	0	0	0	0	0	0	2	—	—	—
05/09	1	1	0	0	1	0	0	0	—	—	1
05/10	0	0	0	0	0	0	0	1	—	—	—
05/11	0	0	0	0	1	0	0	0	—	—	—
05/12	0	0	0	0	0	2	0	1		—	—
05/13	0	0	0	1	2	3	0	0	—	—	—
05/14	0	0	0	0	0	1	0	0	0	0	0
05/15	0	0	0	0	0	0	0	0	0	0	0
05/16	0	0	0	0	1	0	0	0	0	0	0
05/17	0	0	0	0	0	0	0	0	0	0	0
05/18	0	0	0	0	0	0	0	0	0	0	0
05/19	1	0	1	0	0	0	0	0	0	1	0
05/20	0	0	0	0	0	0	0	0	0	0	0
05/21	0	0	0	0	0	0	0	0	1	0	0
05/22	0	3	0	0	0	0	0	0	0	0	0
05/23	0	2	0	0	0	0	0	0	0	0	0
05/24	1	3	0	0	0	0	0	0	0	0	0
05/25	2	2	0	0	0	0	0	0	0	0	0
05/26	1	6	0	0	2	0	0	0	2	1	0
05/27	0	0	0	0	0	0	0	0	0	0	0
05/28	0	0	0	0	0	0	0	0	0	0	0
05/29	0	0	0	1	0	0	0	0	1	0	0
05/30	0	0	0	0	0	0	0	0	0	0	0
05/31	1	0	0	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
06/01	0	0	0	0	--	--	--	--	--	--	--
06/02	--	--	--	--	--	--	--	--	--	--	--
06/03	--	--	--	--	--	--	--	--	--	--	--
06/04	--	--	--	--	--	--	--	--	--	--	--
06/05	--	--	--	--	--	--	--	--	--	--	--
06/06	--	--	--	--	--	--	--	--	--	--	--
06/07	--	--	--	--	--	--	--	--	--	--	--
06/08	--	--	--	--	--	--	--	--	--	--	--
06/09	--	--	--	--	--	--	--	--	--	--	--

Appendix C. Continued.

	Canals										
	L-22 .				L-30				L-30A		
Date	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CHIN
06/10	--	--	--	--	--	--	--	--	—	—	—
06/11	--	--	--	--	--	--	--	--	—	—	—
06/12	--	--	--	--	--	--	--	--	—	—	—
06/13	--	--	--	--	--	--	--	--	—	—	—
06/14	--	--	--	--	--	--	--	--	—	—	—
06/15	--	--	--	--	--	--	--	--	—	—	—
06/16	--	--	--	--	--	--	--	--	—	—	—
06/17	--	--	--	--	--	--	--	--	—	—	—
06/18	--	--	--	--	--	--	--	--	—	—	—
06/19	--	--	--	--	--	--	--	--	—	—	—
06/20	--	--	--	--	--	--	--	--	—	—	—
06/21	--	--	--	--	--	--	--	--	—	—	_
06/22	--	--	--	--	--	--	--	--	—	—	—
06/23	--	--	--	--	--	--	--	--	—	—	—
06/24	--	--	--	--	--	--	--	--		—	—
06/25	0	0	0	1	0	0	0	0	0	0	0
06/26	0	0	0	0	0	0	0	0	0	0	0
06/27	0	0	0	0	0	0	0	0	0	0	0
06/28	0	0	0	0	0	1	0	0	0	0	0
06/26	0	0	0	0	0	0	0	0	0	0	0
06/30	0	0	0	0	0	1	0	0	0	0	0
07/01	1	0	0	0	0	1	0	0	0	0	0
07/02	0	0	0	0	0	0	0	0	0	0	0
07/03	0	0	0	0	0	0	0	0	0	0	0
07/04	0	0	0	0	0	0	0	0	0	0	0
07/05	0	0	0	0	0	0	0	0	0	0	0
07/06	0	0	0	0	0	0	0	0	0	0	0
07/07	1	0	0	0	0	0	0	0	0	0	0
07/08	0	0	0	0	0	1	0	0	0	0	0
07/09	0	0	0	0	0	0	0	0	0	0	0
07/10	0	0	0	0	0	0	0	0	0	0	0
07/11	0	0	0	0	0	0	0	0	0	0	0
07/12	0	0	0	0	0	0	0	0	0	0	0
07/13	1	0	0	0	0	0	1	0	--	--	--
07/14	0	0	0	0	0	0	0	0	--	--	--
07/15	0	0	0	0	0	0	0	0	--	--	--
07/16	0	0	0	0	1	0	0	0	--	--	--
07/17	0	0	0	0	0	0	0	0	--	--	--
07/18	0	0	0	0	0	0	0	0	--	--	--
07/19	0	0	0	0	0	0	0	0	--	--	--
07/20	0	0	0	0	0	0	0	0	--	--	--
07/21	0	0	0	0	0	0	0	0	--	--	--
07/22	0	0	0	0	0	0	0	0	--	--	--
07/23	0	0	0	0	0	2	0	0	--	--	--
07/24	0	0	0	0	0	0	0	0	--	--	--

Appendix C. Continued.

	Canals										
	L-22				L-30				L-30A		
Date	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CHIN
07/25	0	0	0	0	0	0	0	0	—	—	—
07/26	0	0	0	0	0	0	0	0	—	—	—
07/27	0	0	0	0	0	0	0	0	—	—	—
07/28	0	0	0	0	0	0	0	0	—	—	—
07/29	0	0	0	0	0	2	0	0	—	—	—
07/30	0	0	0	0	0	0	0	0	—	—	—
07/31	0	0	0	0	0	0	0	0	—	—	—
08/01	1	0	0	0	1	0	0	0	—	—	—
08/02	0	0	0	0	0	0	0	0	—	—	—
08/03	0	0	0	0	0	0	0	0	—	—	—
08/04	0	0	0	0	0	0	0	0	—	—	—
08/05	0	0	0	0	0	0	0	0	—	—	—
08/06	0	0	0	0	0	0	0	0	—	—	_
08/07	0	0	0	0	0	0	0	0	—	—	—
08/08	0	0	0	0	1	0	0	0	—	—	—
08/09	0	0	0	0	0	0	0	0		—	—
08/10	0	0	0	1	0	0	0	0	—	—	—
08/11	0	0	0	0	0	0	0	0	0	0	0
08/12	0	0	0	0	0	0	0	0	0	0	0
08/13	0	0	0	0	1	0	0	0	0	0	0
08/14	0	0	0	0	0	0	0	0	0	0	0
08/15	0	0	0	0	0	0	0	0	0	0	0
08/16	0	0	0	0	0	0	0	0	0	0	0
08/17	0	0	0	0	0	0	0	0	0	0	0
08/18	0	0	0	0	0	0	0	0	0	0	0
08/19	0	0	0	0	0	0	0	0	0	0	0
08/20	0	0	0	0	0	0	0	0	0	0	0
08/21	0	0	0	0	0	0	0	0	0	0	0
08/22	1	0	0	0	0	0	0	0	0	0	0
08/23	0	0	0	0	0	0	0	0	0	0	0
08/24	0	0	0	0	0	0	0	0	0	0	0
08/25	0	0	0	0	0	0	0	0	0	0	0
08/26	0	0	0	1	0	0	0	0	1	0	0
08/27	0	0	0	0	0	0	0	0	0	0	0
08/28	1	0	0	1	1	0	1	0	0	0	0
08/29	0	0	0	0	0	0	0	2	0	0	0
08/30	0	0	0	0	0	0	0	0	0	0	0
08/31	0	0	0	0	2	0	0	3	0	0	1
09/01	0	0	0	0	0	0	0	2	0	0	0
09/02	0	0	0	4	2	0	0	3	0	0	0
09/03	0	0	0	1	0	0	0	0	0	0	0
09/04	0	0	0	1	2	0	0	0	1	0	0
09/05	0	0	0	0	0	0	0	1	0	0	0
09/06	0	0	0	0	4	0	0	3	0	0	0

Appendix C. Continued.

	Canals										
	L-22				L-30				L-30A		
Date	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CT	CHIN	RBT/SH	BT	CHIN
09/07	0	0	0	0	0	0	0	0	0	0	0
09/08	0	0	0	0	1	0	0	0	0	0	0
09/09	0	0	0	0	3	1	1	2	0	0	0
09/10	0	0	0	0	2	0	0	1	0	0	0
09/11	0	0	0	0	1	2	0	1	0	0	0
09/12	0	0	0	0	5	0	0	1	0	0	0
09/13	0	0	0	0	2	2	0	0	0	0	0
09/14	0	0	0	0	0	1	1	0	0	0	0
09/15	0	0	0	0	0	0	0	1	0	0	0
09/16	0	0	0	0	2	0	0	0	0	0	0
09/17	0	0	0	0	0	0	0	0	0	0	0
09/18	0	0	0	0	0	0	0	0	0	0	0
09/19	0	0	0	0	1	1	0	1	0	0	0
09/20	0	0	0	0	0	0	0	0	0	0	0
09/21	0	0	0	0	3	0	0	0	0	0	0
09/22	0	0	0	0	3	0	0	0	0	0	0
09/23	0	0	0	0	2	0	0	1	0	0	0
09/24	0	0	0	0	0	0	0	0	0	0	0
09/25	0	0	0	0	0	0	0	1	0	0	0
09/26	0	0	0	0	2	1	0	1	0	0	0
09/27	0	0	0	0	0	0	0	0	0	0	0
09/28	0	0	0	0	2	1	0	1	0	0	0
09/29	0	0	0	0	0	0	0	0	0	0	0
09/30	0	0	0	0	0	0	0	2	0	0	0
10/01	0	0	0	0	2	0	0	0	0	0	0
10/02	0	0	0	0	0	0	0	0	0	0	0
10/03	0	0	0	0	0	0	0	0	0	0	0
10/04	—	—	—	—	0	0	0	0	0	0	0
10/05	—	—	—	—	0	0	0	0	0	0	0
10/06	—	—	—	—	0	0	0	0	0	0	0
10/07	—	—	—	—	0	0	0	1	0	0	0
10/08	—	—	—	—	0	0	0	0	0	0	0
10/09	—	—	—	—	1	0	0	15	0	0	0
10/10	1	1	1	6	6	0	0	21	0	0	0
10/11	2	4	0	2	6	0	0	2	0	0	0
10/12	0	0	0	0	3	1	0	8	0	0	0
Total	14	24	1	17	68	24	3	79	5	2	2

Appendix D. Catch of rainbow trout/steelhead (RBT/SH) s75 mm (FL) in canals on Big Springs Creek, Idaho, 1997 irrigation season. Dashes (—) represent periods of canal closure.

	Canals			
Date	BSC-3 RBT/SH	BSC-4 RBT/SH	BSC-5 RBT/SH	BSC-5A RBT/SH
05/06	0	—	—	—
05/07	0	—	—	—
05/08	0	—	—	—
05/09	0	—	—	—
05/10	0	—	—	—
05/11	0	—	—	—
05/12	0	—	—	—
05/13	0	—	—	—
05/14	0	—	—	—
05/15	0	—	—	—
05/16	0	—	—	—
05/17	0	—	0	—
05/18	0	—	0	—
05/19	0	—	0	—
05/20	0	—	0	—
05/21	0	—	0	—
05/22	0	0	0	—
05/23	0	2	0	0
05/24	0	0	0	0
05/25	0	0	0	0
05/26	0	0	0	0
05/27	0	0	0	0
05/28	0	0	0	0
05/29	0	0	0	0
05/30	0	0	0	0
05/31	0	0	0	0
06/01	0	0	0	0
06/02	0	0	0	0
06/03	0	0	0	0
06/04	0	0	0	0
06/05	0	0	0	0
06/06	0	0	0	0
06/07	0	0	0	0
06/08	0	0	0	0
06/09	0	0	0	1
06/10	0	0	0	0
06/11	0	0	0	0
06/12	0	0	0	0
06/13	0	0	0	0
06/14	0	0	0	0
06/15	0	0	0	0
06/16	0	0	0	0
06/17	0	0	0	0
06/18	0	0	0	0

Appendix D. Continued.

Date	Canals			
	BSC-3 RBT/SH	BSC-4 RBT/SH	BSC-5 RBT/SH	BSC-5A RBT/SH
06/19	0	0	1	2
06/20	0	0	0	0
06/21	0	0	0	1
06/22	0	0	0	1
06/23	0	0	0	1
06/24	0	0	1	2
06/25	0	0	0	0
06/26	0	0	0	0
06/27	0	0	0	0
06/28	0	0	0	0
06/29	3	0	0	0
06/30	0	0	1	0
07/01	0	0	0	3
07/02	0	0	0	0
07/03	1	0	3	0
07/04	0	0	0	0
07/05	1	0	2	0
07/06	3	0	0	0
07/07	0	0	2	0
07/08	4	1	0	2
07/09	1	0	0	0
07/10	0	0	0	0
07/11	4	0	0	0
07/12	0	0	0	0
07/13	1	1	0	0
07/14	0	0	0	0
07/15	1	0	0	2
07/16	3	0	1	2
07/17	1	1	0	1
07/18	0	0	0	0
07/19	1	0	0	0
07/20	0	0	0	0
07/21	1	0	1	0
07/22	0	1	0	0
07/23	0	0	2	1
07/24	2	0	0	2
07/25	0	0	0	0
07/26	0	0	0	0
07/27	1	0	0	0
07/28	0	0	0	1
07/29	0	1	3	6
07/30	0	0	0	0
07/31	0	0	0	2
08/01	0	0	0	1

Appendix D. Continued.

Date	Canals			
	BSC-3 RBT/SH	BSC-4 RBT/SH	BSC-5 RBT/SH	BSC-5A RBT/SH
08/02	0	0	2	1
08/03	0	0	0	3
08/04	0	0	0	0
08/05	0	0	0	1
08/06	1	0	0	0
08/07	0	1	1	1
08/08	0	0	1	0
08/09	0	0	2	1
08/10	0	0	1	0
08/11	0	0	0	0
08/12	0	0	1	3
08/13	0	0	0	1
08/14	0	0	0	0
08/15	1	0	0	2
08/16	0	0	0	1
08/17	0	0	0	3
08/18	0	0	0	0
08/19	0	0	0	0
08/20	0	0	23	0
08/21	0	0	8	1
08/22	4	0	13	0
08/23	2	0	5	0
08/24	0	0	4	0
08/25	0	0	3	0
08/26	2	0	19	0
08/27	5	0	7	0
08/28	2	0	4	0
08/29	0	0	6	0
08/30	0	0	0	0
08/31	6	0	12	1
09/01	0	0	2	0
09/02	0	0	9	1
09/03	0	0	6	0
09/04	1	0	10	1
09/05	0	0	0	0
09/06	3	0	24	0
09/07	0	0	3	0
09/08	1	0	9	0
09/09	0	0	4	0
09/10	2	0	5	0
09/11	2	0	8	2
09/12	0	0	3	0
09/13	0	0	0	0
09/14	3	0	2	2
09/15	0	0	2	0

Appendix D. Continued.

Date	Canals			
	BSC-3 RBT/SH	BSC-4 RBT/SH	BSC-5 RBT/SH	BSC-5A RBT/SH
09/16	0	0	0	0
09/17	0	0	0	0
09/18	0	0	0	0
09/19	0	0	1	0
09/20	0	0	0	0
09/21	0	0	0	0
09/22	0	0	0	0
09/23	0	0	1	0
09/24	0	0	0	0
09/25	0	0	1	0
09/26	0	0	2	0
09/27	0	0	0	1
09/28	0	0	0	1
09/29	0	0	0	0
09/30	1	0	0	0
10/01	0	0	0	0
10/02	0	0	1	0
10/03	0	0	0	0
10/04	0	0	0	0
10/05	0	0	0	0
10/06	0	0	0	0
10/07	1	0	0	2
10/08	0	0	0	0
10/09	3	0	4	0
10/10	4	0	1	9
10/11	0	0	0	0
10/12	0	1	0	0
Total	70	9	227	69

Appendix E. Catch of rainbow trout/steelhead (RBT/SH), eastern brook trout (EB), and bull trout (BT) >75 mm (FL) in canals on Big Springs Creek, Idaho, 1997 irrigation season. Dashes (—) represent periods of canal closure.

	Canals							
	BSC-3		BSC-4	BSC-5	BSC-5		BSC-5A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	BT	EB	RBT/SH	EB
05/06	0	0	--	--	--	--	--	--
05/07	0	0	--	--	--	--	--	--
05/08	0	0	--	--	--	--	--	--
05/09	0	0	--	--	--	--	--	--
05/10	0	0	--	--	--	--	--	--
05/11	0	0	--	--	--	--	--	--
05/12	0	0	--	--	--	--	--	--
05/13	0	0	--	--	--	--	--	--
05/14	0	0	--	--	--	--	--	--
05/15	0	0	--	--	--	--	--	--
05/16	0	0	--	--	--	--	--	--
05/17	0	0	--	0	0	0	--	--
05/18	0	0	--	0	0	0	--	--
08/19	0	0	--	12	1	0	--	--
05/20	0	0	--	0	0	0	--	--
05/21	0	0	0	1	0	0	--	--
05/22	0	0	0	2	0	0	--	--
05/23	6	0	4	0	0	0	0	0
05/24	0	0	4	5	0	0	1	0
05/25	1	0		0	0	0	1	0
05/26	0	0	0	1	0	0	0	0
05/27	10	0	0	0	0	0	0	0
05/28	4	0	0	2	0	0	0	0
05/29	0	0	0	0	0	0	0	0
05/30	0	0	0	0	0	0	0	0
05/31	0	0	0	2	0	0	1	0
06/01	0	0	0	0	0	0	0	0
06/02	0	0	1	0	0	0	0	0
06/03	0	0	2	1	0	0	0	0
06/04	0	0	1	1	0	0	0	0
06/05	0	0	0	0	0	0	0	0
06/06	0	0	0	0	0	0	0	0
06/07	0	0	0	2	0	0	0	0
06/08	0	0	0	2	0	0	0	0
06/09	0	0	0	0	0	0	0	0
06/10	0	0	0	0	0	0	0	0
06/11	4	0	6	0	0	0	0	0
06/12	0	0	0	0	0	0	0	0
06/13	0	0	0	0	0	0	0	0
06/14	0	0	0	0	0	0	0	0
06/15	0	0	0	0	0	0	0	0
06/16	0	0	0	0	0	0	0	0
06/17	0	0	0	0	0	0	0	0

Appendix E. Continued.

	Canals							
	BSC-3		BSC-4	BSC-5	BSC-5		BSC-5A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	BT	EB	RBT/SH	EB
06/08	0	0	1	1	0	0	0	0
06/19	1	0	0	2	0	0	2	0
06/20	0	0	0	3	0	0	0	0
06/21	1	0	0	0	0	0	0	0
06/22	0	0	1	0	0	0	0	0
06/23	0	0	0	0	0	0	0	0
06/24	0	0	0	0	0	0	0	0
06/25	0	0	0	0	0	0	1	0
06/26	0	0	0	0	0	0	0	0
06/27	0	0	0	0	0	0	0	0
06/28	0	0	0	0	0	0	0	0
06/29	0	0	0	0	0	0	0	0
06/30	0	0	0	1	0	0	0	0
	0	0						
07/01	0	0	0	0	0	0	0	0
07/02	0	0	0	0	0	0	0	0
07/03	1	0	0	0	0	0	0	0
07/04	0	0	0	0	0	0	0	0
07/05	0	0	0	0	0	0	0	0
07/06	1	0	0	0	0	0	0	0
07/07	0	0	0	0	0	0	0	0
07/08	0	0	0	0	0	0	0	0
07/09	1	0	0	0	0	0	0	0
07/10	0	0	0	0	0	0	0	0
07/11	0	0	0	0	0	0	0	0
07/12	0	0	0	2	0	0	1	0
07/13	0	0	0	0	0	0	0	0
07/14	0	0	0	0	0	0	0	0
07/15	2	0	0	0	0	0	1	0
07/16	0	0	0	0	0	0	0	0
07/17	2	0	1	0	0	0	0	0
07/18	0	0	0	0	0	0	0	0
07/19	1	0	0	0	0	0	1	0
07/20	0	0	0	0	0	0	0	0
07/21	0	0	0	0	0	0	0	0
07/22	0	0	0	0	0	0	0	0
07/23	0	0	0	0	0	0	1	0
07/24	4	0	6	0	0	0	1	0
07/25	0	0	0	0	0	0	0	0
07/26	0	0	0	0	0	0	0	0
07/27	0	0	0	0	0	0	0	0
07/28	0	0	0	0	0	0	0	0
07/29	0	0	0	0	0	0	0	0
07/30	1	0	0	0	0	0	2	0
07/31	0	0	0	0	0	0	1	0

Appendix E. Continued.

	Canals							
	BSC-3		BSC-4	BSC-5	BSC-5		BSC-5A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	BT	EB	RBT/SH	EB
08/01	0	1	0	0	0	0	0	0
08/02	0	0	0	1	0	0	0	0
08/03	0	0	0	0	0	0	0	0
08/04	1	0	0	0	0	0	0	0
08/05	0	0	1	0	0	0	2	0
08/06	0	0	0	0	0	0	0	0
08/07	0	0	0	1	0	0	0	0
08/08	0	0	0	0	0	0	0	0
08/09	0	0	0	0	0	0	0	0
08/10	0	0	0	0	0	0	0	0
08/11	0	0	0	0	0	0	0	0
08/12	0	0	0	0	0	0	0	0
08/13	0	0	0	0	0	0	0	0
08/14	0	0	0	0	0	0	0	0
08/15	0	0	0	0	0	0	0	0
08/16	0	0	0	0	0	0	0	0
08/17	0	0	0	0	0	0	1	0
08/18	0	0	0	0	0	0	0	0
08/19	0	0	0	0	0	0	0	0
08/20	1	0	0	7	0	0	0	0
08/21	0	0	0	5	0	0	0	0
08/22	2	0	0	6	1	0	0	0
08/23	2	0	0	5	0	0	0	0
08/24	0	0	0	3	0	0	0	0
08/25	0	0	0	1	0	0	0	0
08/26	0	0	0	5	0	0	0	0
08/27	0	0	0	0	0	0	0	0
08/28	2	0	0	0	0	0	0	0
08/29	0	0	0	2	0	0	0	0
08/30	2	0	0	0	0	0	0	0
08/31	0	0	0	1	0	0	0	0
09/01	10	0	0	0	0	0	0	0
09/02	0	0	0	0	0	0	0	0
09/03	1	0	0	0	0	0	0	0
09/04	0	0	0	0	0	0	0	0
09/05	0	0	0	0	0	0	0	1
09/06	1	0	0	0	0	0	0	0
09/07	0	0	0	0	0	0	0	0
09/08	0	0	0	0	0	0	0	0
09/09	0	1	0	0	0	0	0	0
09/10	0	0	0	0	0	0	0	0
09/11	1	0	0	0	0	0	0	0
09/12	0	0	0	0	0	0	0	0
09/13	0	0	0	6	0	0	0	0
09/14	3	0	1	0	0	1	0	0

Appendix E. Continued.

	Canals							
	BSC-3		BSC-4	BSC-5	BSC-5		BSC-5A	
Date	RBT/SH	EB	RBT/SH	RBT/SH	BT	EB	RBT/SH	EB
09/15	0	0	0	1	0	0	0	0
09/16	0	0	0	0	0	0	0	0
09/17	0	0	0	0	0	0	0	0
09/18	0	0	0	0	0	0	0	0
09/19	0	0	0	0	0	0	0	0
09/20	0	0	0	0	0	0	0	0
09/21	0	0	0	0	0	0	0	0
09/22	0	0	0	0	0	0	0	0
09/23	0	0	0	1	0	0	0	0
09/24	0	0	0	0	0	0	0	0
09/25	0	0	0	4	0	0	0	0
09/26	0	0	0	0	0	0	0	0
09/27	0	0	1	0	0	0	0	0
09/28	1	0	0	0	0	0	1	0
09/29	0	0	0	0	0	0	0	0
09/30	2	1	0	0	0	0	0	0
10/01	0	0	0	0	0	0	0	0
10/02	2	0	0	1	0	0	1	0
10/03	0	0	0	0	0	0	0	0
10/04	0	0	0	0	0	0	0	1
10/05	0	0	0	0	0	0	0	0
10/06	1	0	0	0	0	0	0	0
10/07	2	0	0	0	0	0	0	0
10/08	0	0	0	0	0	0	0	0
10/09	7	0	0	4	0	0	0	0
10/10	3	0	0	2	0	0	4	0
10/11	0	0	0	0	0	0	0	0
10/12	2	0	1	1	0	0	1	0
Total	74	3	25	135	2	2	23	2

Appendix F. Catch of rainbow troutlsteelhead (RBT/SH), eastern brook trout (EB), and bull trout (BT), and chinook salmon (CHIN) s75 mm (FL) in canals on the Pahsimeroi River, Idaho, 1997 irrigation season. Dashes (—) represent periods of canal closure.

	Canals										
	P-3		P-4	P-5		P-7			P-8A		
Date	RBT/SH	EB	RBT/SH	RBT/SH	EB	RBT/SH	EB	CHIN	RBT/SH	EB	BT
05/10	0	0	—	0	0	—	—	—	—	—	—
05/11	0	0	—	0	0	—	—	—	—	—	—
05/12	0	0	—	0	0	—	—	—	0	0	0
05/13	0	0	—	0	0	0	0	1	0	0	0
05/14	0	0	—	0	0	0	0	0	0	0	0
05/15	0	0	—	0	0	0	0	1	0	0	0
05/16	0	0	—	0	0	0	0	0	0	0	0
05/17	0	0	—	0	0	0	0	0	0	0	0
05/18	0	0	—	0	0	0	0	0	0	0	0
05/19	0	0	—	0	0	0	0	0	0	0	0
05/20	0	0	—	0	0	0	0	0	0	0	0
05/21	0	0	—	0	0	0	0	0	0	0	0
05/22	0	0	—	0	0	0	0	0	0	0	0
05/23	0	0	—	0	0	0	0	0	0	0	0
05/24	0	0	—	0	0	0	0	0	0	0	0
05/25	0	0	—	0	0	0	0	0	0	0	0
05/26	0	0	—	0	0	0	0	0	0	0	0
05/27	0	0	—	0	0	0	0	0	0	0	0
05/28	0	0	—	0	0	0	0	0	0	0	0
05/29	—	—	—	0	0	0	0	0	0	0	0
05/30	—	—	—	0	0	0	0	0	0	0	0
05/31	—	—	—	0	0	0	0	0	0	0	0
06/01	—	—	—	0	0	0	0	0	0	0	0
06/02	—	—	—	0	0	0	0	0	0	0	0
06/03	—	—	—	0	0	0	0	0	0	0	0
06/04	—	—	—	0	0	0	0	0	0	0	0
06/05	—	—	—	0	0	0	0	0	—	—	
06/06	—	—	—	0	1	0	0	0	—	—	—
06/07	—	—	—	0	0	0	0	0	—	—	—
06/08	—	—	—	0	1	0	0	0	—	—	—
06/09	—	—	—	1	3	0	1	0	0	0	0
06/10	—	—	—	0	0	0	0	0	0	0	0
06/11	—	—	—	0	0	0	0	0	0	0	0
06/12	—	—	—	0	0	—	—	—	0	0	0
06/13	—	—	—	0	0	—	—	—	0	0	0
06/14	—	—	—	0	0	0	0	0	0	0	0
06/15	—	—	—	0	0	0	0	0	0	0	0
06/16	—	—	—	0	0	0	0	0	0	0	0
06/17	—	—	—	0	0	2	0	0	0	0	0
06/18	—	—	—	2	1	0	0	0	0	0	0
06/19	—	—	0	0	0	0	0	0	0	0	0
06/20	—	—	0	0	0	0	0	0	0	0	0
06/21	—	—	0	0	0	0	0	0	0	0	0

Appendix F. Continued.

	Canals										
	P-3		P-4	P-5		P-7			P-8A		
Date	RBT/SH	EB	RBT/SH	RBT/SH	EB	RBT/SH	EB	CHIN	RBT/SH	EB	BT
06/22	—	—	0	0	0	0		0	0	0	0
06/23	—	—	0	1	0	0	0	0	0	0	0
06/24	—	—	0	0	0	0	0	0	0	0	0
06/25	—	—	10	4	0	0	0	0	—	—	—
06/26	0	0	0	20	0	0	0	0	—	—	—
06/27	17	0	10	0	0	2	0	0	—	—	—
06/28	5	0	11	11	0	7	0	0	—		—
06/29	0	0	27	2	0	1	0	0	—	—	—
06/30	9	0	7	4	0	5	0	0	—	—	—
07/01	9	0	5	3	0	4	0	0	—	—	—
07/02	9	0	9	9	0	7	0	0	—	—	—
07/03	8	5	0	0	0	0	0	0	—	—	—
07/04	17	1	23	10	0	21	0	0	—	—	—
07/05	20	1	19	4	0	13	0	0	—	—	—
07/06	18	1	4	5	0	5	0	0	—	—	—
07/07	9	0	8	0	0	1	0	0	—	—	—
07/08	4	0	4	0	0	8	0	0	—	—	—
07/09	0	0	5	1	0	0	0	0	—	—	—
07/10	3	0	2	5	0	0	0	0	—	—	—
07/11	3	0	0	0	0	2	0	0	5	1	0
07/12	5	0	1	4	0	10	0	0	1	0	0
07/13	3	0	0	5	0	6	0	0	0	0	0
07/14	6	0	2	4	0	2	0	0	0	0	0
07/15	1	0	0	3	0	0	0	0	0	0	0
07/16	2	0	0	4	0	0	0	0	0	0	0
07/17	0	0	0	0	0	0	0	0	0	0	0
07/18	0	0	2	2	0	0	0	0	0	0	1
07/19	0	0	0	2	0	0	0	0	0	0	0
07/20	4	0	0	5	0	3	0	0	—	—	—
07/21	2	0	2	1	0	0	0	0	—	—	—
07/22	5	0	2	1	0	1	0	0	—	—	—
07/23	11	0	0	2	0	0	0	0	—	—	—
07/24	3	0	2	5	0	0	0	0	—	—	—
07/25	0	0	2	0	0	1	0	0	—	—	—
07/26	2	0	1	2	0	0	0	0	—	—	—
07/27	12	0	5	3	0	1	0	0	11	0	0
07/28	14	0	1	1	0	2	0	0	0	0	0
07/29	16	0	13	5	0	1	0	0	0	0	0
07/30	15	0	2	2	0	0	0	0	0	0	0
07/31	17	0	6	5	0	10	0	0	0	0	0
08/01	14	1	16	7	0	9	0	0	0	0	0
08/02	13	0	4	6	0	4	0	0	0	0	0
08/03	0	0	11	14	0	12	0	0	0	0	0
08/04	0	0	6	118	0	12	0	0	0	0	0

Appendix F. Continued.

	Canals										
	P-3		P-4	P-5		P-7			P-8A		
Date	RBT/SH	EB	RBT/SH	RBT/SH	EB	RBT/SH	EB	CHIN	RBT/SH	EB	BT
08/05	2	0	10	26	0	10	0	0	0	0	0
08/06	0	0	5	13	0	7	0	0	0	0	0
08/07	0	0	6	10	0	4	0	0	0	0	0
08/08	0	0	7	3	0	0	0	0	9	0	0
08/09	0	0	3	7	0	7	0	0	0	0	0
08/10	0	0	4	8	0	2	0	0	0	0	0
08/11	–	–	8	4	0	15	0	0	0	0	0
08/12	–	–	9	6	0	4	0	0	0	0	0
08/13	–	–	4	4	0	4	0	0	0	0	0
08/14	–	–	3	0	0	3	0	0	0	0	0
08/15	–	–	1	1	0	1	0	0	0	0	0
08/16	–	–	0	4	0	5	0	0	0	0	0
08/17	–	–	0	0	0	0	0	0	0	0	0
08/18	–	–	1	5	0	5	0	0	0	0	0
08/19	—	—	0	0	0	0	0	0	0	0	0
08/20	0	0	0	0	0	0	0	0	0	0	0
08/21	0	0	0	2	0	2	0	0	0	0	0
08/22	0	0	1	3	0	1	0	0	0	0	0
08/23	–	–	1	6	0	4	0	0	0	0	0
08/24	–	–	1	1	0	2	0	0	0	0	0
08/25	–	–	0	0	0	1	0	0	0	0	0
08/26	–	–	1	0	0	1	0	0	0	0	0
08/27		–	2	2	0	0	0	0	0	0	0
08/28	–	–	1	4	0	0	0	0	0	0	0
08/29	–	–	1	2	0	0	0	0	0	0	0
08/30	–	–	1	0	0	0	0	0	0	0	0
08/31	–	–	0	3	0	0	0	0	0	0	0
09/01	–	–	0	3	0	0	0	0	0	0	0
09/02	–	–	–	4	0	0	0	0	0	0	0
09/03	0	0	–	0	0	0	0	0	0	0	0
09/04	1	0	–	2	0	1	0	0	0	0	0
09/05	1	0	–	1	0	0	0	0	0	0	0
09/06	1	0	–	0	0	0	0	0	0	0	0
09/07	0	0	–	2	0	0	0	0	0	0	0
09/08	0	0	–	2	0	0	0	0	0	0	0
09/09	0	0	–	2	0	0	0	0	0	0	0
09/10	1	0	–	3	0	1	0	0	0	0	0
09/11	0	0	–	2	0	0	0	0	0	0	0
09/12	0	0	–	1	0	0	0	0	0	0	0
09/13	–	–	–	0	0	0	0	0	–	–	–
09/14	–	–	–	1	0	0	0	0	–	–	–
09/15	--	–	–	1	0	0	0	0	–	–	
09/16	–	–	–	0	0	0	0	0	–	–	–
09/17	–	–	–	0	0	0	0	0	–	–	–
09/18	–	–	–	5	0	0	0	0	–	–	–

Appendix F. Continued.

	Canals										
	P-3		P-4	P-5		P-7			P-8A		
Date	RBT/SH	EB	RBT/SH	RBT/SH	EB	RBT/SH	EB	CHIN	RBT/SH	EB	BT
09/19	—	—	_	1	0	0	0	0	—	—	—
09/20	—	—	—	3	0	0	0	0	—	—	—
09/21	—	—	—	—	—	0	0	0	—	—	—
09/22	—	—	—	—	—	0	0	0	—	—	—
09/23	—	—	—	—	—	0	0	0	—	—	—
09/24	—	—	_	—	—	0	0	0	—	—	—
09/25	—	—	—	—	—	0	0	0	—	—	—
09/26	—	—	—	—	—	0	0	0	—	—	—
09/27	—	—	—	—	—	0	0	0	—	—	—
09/28	—	—	—	0	0	0	0	0	—	—	—
09/29	—	—	—	0	0	0	0	0	—	—	—
09/30	—	—	0	0	0	1	0	0	—	—	—
10/01	—	—	0	1	0	0	0	0	—	—	—
10/02	—	—	0	0	0	0	0	0	—	—	—
10/03	0	0	0	0	0	0	0	0	—	—	—
10/04	0	0	—	0	0	0	0	0	—	—	—
10/05	—	—	—	0	0	0	0	0	—	—	—
10/06	—	—	—	0	0	0	0	0	—	—	—
10/07	—	—	—	0	0	0	0	0	—	—	—
10/08	—	—	—	0	0	0	0	0	—	—	—
10/09	—	—	—	0	0	0	0	0	—	—	—
10/10	—	—	—	0	0	0	0	0	—	—	—
Total	282	9	292	432	6	233	1	2	26	1	1

Appendix G. Catch of rainbow trout/steelhead (RBT/SH), eastern brook trout (EB), and bull trout (BT), and chinook salmon >75 mm (FL) oo in canals on the Pahsimeroi River, Idaho, 1997 irrigation season. Dashes (--) represent periods of canal closure.

	Canals															
	P-3			P-4			P-5			P-7			P-8A			
Date	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	BT	CHIN
05/10	0	0	0	--	--		0	0	0	--	--	--	--	--	--	--
05/11	0	0	0	--	--		0	0	0	--	--	--	--	--	--	--
05/12	23	2	0	--	--		2	1	0	--	--	--	3	1	0	0
05/13	10	0	0	--	--		64	1	3	--	--	--	4	0	0	0
05/14	17	1	0	--	--		70	2	3	4	2	0	1	1	0	0
05/15	4	0	0	--	--		20	0	2	3	1	0	0	0	0	0
05/16	4	0	0	--	--		53	0	4	3	0	0	4	1	0	0
05/17	3	1	0	--	--		11	0	0	0	0	0	0	0	0	0
05/18	0	0	0	--	--		23	0	0	0	0	1	0	0	0	0
05/19	0	0	0	--	--		31	0	1	0	0	0	2	0	0	0
05/20	1	1	0	--	--		28	0	3	2	0	0	0	0	0	0
05/21	0	0	0	--	--		13	0	1	1	0	0	0	0	0	0
05/22	0	0	0	--	--		7	0	1	4	0	0	0	0	0	0
05/23	1	0	0	--	--		8	0	2	9	0	0	3	3	0	0
05/24	1	0	0	--	--		6	0	7	1	0	3	0	0	0	0
05/25	2	0	1	--	--		2	0	9	4	0	0	0	0	0	0
05/26	3	0	1	--	--		6	0	4	7	0	1	0	0	0	0
05/27	0	0	0	--	--		6	1	3	8	0	5	1	1	0	0
05/28	0	0	1	--	--		7	0	3	3	0	1	0	0	0	0
05/29	--	--	--	--	--		0	0	4	4	0	0	3	3	0	0
05/30	--	--	--	--	--		6	0	0	4	0	2	0	0	0	0
05/31	--	--	--	--	--		5	0	7	1	0	4	1	1	0	0
06/01	--	--	--	--	--		5	0	7	4	1	4	1	1	0	0
06/02	--	--	--	--	--		7	1	8	3	0	5	0	0	0	0
06/03	--	--	--	--	--		12	0	12	5	0	8	0	0	0	0
06/04	--	--	--	--	--		5	0	13	4	0	1	0	0	0	0
06/05	--	--	--	--	--		7	0	2	1	0	1	--			--
06/06	--	--	--	--	--		16	1	4	2	0	3	--	--	--	--
06/07	--	--	--	--	--		3	1	4	0	0	1	--	--	--	--
06/08	--	--	--	--	--		1	0	5	1	0	0	--	--	--	--
06/09	--	--	--	--	--		1	0	2	1	0	0	0	0	0	0

Appendix G. Continued.

	Canals															
	P-3			P-4			P-5			P-7			P-8A			
Date	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	BT	CHIN
06/10	--	--					3	0	1	0	0	3	0	0	0	0
06/11	--	--	--	--	--	--	0	0	0	0	0	3	0	0	0	0
06/12	--	--	--	--	--	--	2	0	0	--	--	--	0	0	0	0
06/13	--	--	--	--	--	--	0	0	0	--	—	—	0	0	0	0
06/14	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0
06/15	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0
06/16	--	--	--	--	--	--	0	0	0	2	0	5	0	0	0	0
06/17	--	--	--	--	--	--	4	1	1	1	0	2	0	0	0	0
06/18	--	--	--	--	--	--	4	0	2	2	0	0	0	0	0	0
06/19	--	--	--	--	--	--	0	0	3	0	0	0	0	0	0	0
06/20	--	--	—	0	0	0	0	0	3	1	0	0	0	0	0	0
06/21	--	--	--	0	0	1	1	0	3	0	0	0	0	0	0	0
06/22	--	--	—	0	0	0	0	0	2	0	0	1	0	0	0	0
06/23	--	--	--	0	0	0	1	0	2	1	0	0	0	0	0	0
06/24	--	--	--	0	0	2	0	0	0	0	0	1	0	0	0	0
06/25	--	--	—	1	0	0	0	0	0	0	0	1	—	--		
06/26	0	0	0	0	0	0	1	0	3	0	0	1	—	—		
06/27	0	0	0	0	0	0	0	0	1	3	0	0	--	—		
06/28	0	0	2	0	0	0	1	0	1	3	0	2	--			
06/29	2	0	0	0	0	0	0	0	0	2	0	1	--	—		--
06/30	1	0	1	0	0	0	0	0	0	1	0	1	--	--	--	--
07/01	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
07/02	0	0	1	1	0	0	0	0	1	0	0	0	--		--	--
07/03	0	2	1	0	0	0	0	0	1	0	0	0	--		--	--
07/04	1	0	0	0	0	0	0	0	0	0	0	0	--	—	--	--
07/05	0	0	0	0	0	0	0	0	0	0	0	0	--	—	--	--
07/06	0	0	0	0	0	0	1	0	0	0	1	0	--	--	--	--
07/07	0	0	0	0	0	0	0	0	0	0	0	0	--		--	--
07/08	0	0	0	0	0	0	0	0	0	0	0	0	--	—	--	--
07/09	0	1	0	0	0	0	0	0	0	0	0	0	--	—	--	--
07/10	0	0	0	0	0	0	0	0	1	0	0	0	--	--	--	--
07/11	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Appendix G. Continued.

	Canals															
	P-3			P-4			P-5			P-7			P-8A			
Date	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	BT	CHIN
07/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07/13	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
07/14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
07/15	1	1	0	0	0	0	0	0	0	2	1	0	0	0	0	0
07/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07/17	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
07/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07/19	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
07/20	0	0	0	0	0	0	1	0	1	0	0	0	--	--	--	--
07/21	0	0	0	0	0	0	1	0	0	0	0	0	--	--	--	--
07/22	0	0	0	0	0	0	3	0	0	0	0	0	--		–	--
07/23	1	0	0	0	0	0	3	0	0	0	0	0	--	--	--	—
07/24	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--
07/25	2	0	0	0	0	0	0	0	0	1	0	0	--	--	--	--
07/26	1	0	0	1	0	0	0	0	0	0	0	0	--	--	--	--
07/27	1	0	0	0	0	0	1	0	0	0	0	0	2	5	0	0
07/28	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
07/29	2	0	0	3	0	0	1	0	0	1	0	0	1	0	0	0
07/30	3	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0
07/31	1	1	0	0	0	0	3	0	0	1	0	0	5	0	0	0
08/01	3	0	0	2	0	0	7	0	0	2	0	0	1	0	0	0
08/02	3	3	0	1	0	0	3	1	0	1	0	0	0	0	0	0
08/03	3	1	0	1	0	0	5	0	0	7	0	0	0	1	0	0
08/04	0	0	2	2	0	0	83	0	0	1	0	0	3	0	0	0
08/05	0	0	0	1	1	0	18	1	1	1	1	0	0	0	2	0
08/06	0	0	0	2	0	0	6	0	0	0	0	0	0	0	0	0
08/07	0	0	0	2	0	0	3	0	0	3	0	0	2	0	0	0
08/08	0	0	0	3	0	0	2	0	0	0	0	0	3	0	0	0
08/09	0	0	0	3	0	0	6	0	0	6	0	0	0	0	0	0
08/10	0	0	0	3	0	0	4	0	0	1	0	0	0	0	0	0
08/11	--	--	--	2	1	0	3	1	0	13	1	0	3	1	0	0
08/12	--	--	--	5	0	0	0	0	0	2	0	0	0	1	0	0

Appendix G. Continued.

	Canals																
	P-3			P-4			P-5			P-7			P-8A				
Date	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	BT	CHI	
08/13	--	--	--	0	0	0	2	0	0	6	0	1	0	0	0	0	
08/14	--	--	--	5	0	0	8	0	0	1	0	0	1	2	0	1	
08/15	--	--	--	2	0	0	1	0	0	0	0	0	0	0	0	0	
08/16	--	--	--	1	0	0	4	0	0	5	0	0	0	0	0	0	
08/17	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	
08/18	--	--	--	3	0	0	9	1	0	2	0	1	1	0	0	0	
08/19	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	
08/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
08/21	0	0	0	1	0	0	1	0	0	1	1	3	0	0	0	0	
08/22	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	
08/23	--	--	--	2	0	0	2	0	.0	3	0	1	1	0	0	0	
08/24	--	--	--	2	0	0	2	0	0	1	0	2	0	0	0	0	
08/25	--	--	--	0	0	0	1	0	0	1	0	0	0	1	0	0	
08/26	--	--	--	3	0	0	0	0	0	3	0	4	0	0	0	0	
08/27	--	--	--	1	0	0	1	0	1	3	0	2	0	0	0	0	
08/28	--	--	--	3	0	0	1	0	0	4	0	2	1	1	0	0	
08/29	--	--	--	1	0	0	0	0	0	0	0	0	0	0	0	0	
08/30	--	--	--	0	0	0	6	0	0	6	0	1	1	0	0	0	
08/31	--	--	--	1	0	0	4	0	0	3	0	1	1	0	0	0	
09/01	--	--	--	2	0	0	4	0	0	5	0	1	0	0	0	0	
09/02	--	--	--	--	--	--	2	0	0	3	0	0	0	0	0	0	
09/03	4	0	0	--	--	--	1	0	0	2	1	0	0	0	0	0	
09/04	2	0	0	--	--	--	2	0	0	1	0	0	1	0	0	0	
09/05	2	0	0	--	--	--	4	0	0	2	1	0	1	0	0	0	
09/06	2	0	0	--	--	--	13	0	0	6	0	0	0	0	0	0	
09/07	1	0	0	--	--	--	7	1	0	4	0	0	0	0	0	0	
09/08	0	0	0	--	--	--	7	0	0	0	0	0	0	1	0	0	
09/09	0	0	0	--	--	--	0	0	0	2	0	0	0	1	0	0	
09/10	0	0	0	--	--	--	2	0	0	1	0	0	0	0	0	0	
09/11	0	0	0	--	--	--	3	0	0	8	1	0	0	0	0	0	
09/12	4	0	0	--	--	--	20	1	0	16	0	3	0	0	0	0	
09/13	--	--	--	--	--	--	27	3	2	11	0	0	--	--	--	--	

Appendix G. Continued.

	Canals															
	P-3			P-4			P-5			P-7			P-8A			
Date	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHIN	RBT/SH	EB	CHI	RBT/SH	EB	BT	CHIN
09/14	--	--	--	--	--	--	15	0	0	12	1	0	--	--		--
09/15	--	--	--	--		--	14	0	2	28	4	11	--	--		--
09/16	--	--	--	--		--	35	1	6	56	1	18	--	--		--
09/17	--	--	--	--		--	31	6	5	17	3	12	--	--		--
09/18	--	--	--	--	--	--	38	1	5	25	3	10	--	--		--
09/19	--	--	--	--	--	--	5	0	0	3	1	5	--	--		--
09/20	--	--	--	--	--	--	14	0	2	5	0	5	--	--		--
09/21	--	--	--	--	--	--	--	_	_	4	1	5	--	--		--
09/22	--	--	--	--	--	--	--	--	--	11	2	2	--	--		--
09/23	--	--	--	--	--	--	--	--	--	7	4	0	--	--		--
09/24	--	--	--	--	--	--	--	--	--	1	4	3	--	--		--
09/25	--	--	--	--	--	--	--	--	--	10	1	4	--	--		--
09/26	--	--	--	--	--	--	--	--	--	4	6	3	--	--		--
09/27	--	--	--	--	--	--	--	--	--	10	15	6	--	--		--
09/28	--	--	--	--	--	--	21	0	0	11	14	14	--	--		--
09/29	--	—	--	--	--	--	18	1	1	39	23	23	--	--		--
09/30	--	--	--	0	0	0	3	0	1	3	5	2	--	--		--
10/01	--	--	--	0	0	0	7	1	1	7	5	4	--	--		--
10/02	--	--	--	0	0	0	16	3	0	3	2	2	--	--		--
10/03	0	0	0	0	0	0	15	0	0	1	3	1	--	--		--
10/04	4	0	0	--	--	--	1	0	0	3	2	1	--	--		--
10/05	--	—	--	--	--	--	0	0	0	0	0	0	--	--		--
10/06	--	--	--	--	--	--	13	3	0	6	7	4	--	--		--
10/07	--	--	--	--	--	--	8	0	0	5	11	3	--	--		--
10/08	--	--	--	--	--	--	9	0	0	7	6	1	--	--		--
10/09	--	--	--	--	--	--	0	0	0	0	0	0	--	--		--
10/10	--	--	--	--	--	--	0	0	0	0	0	0	--	--		--
Total	113	14	10	60	3	3	999	34	170	519	136	223	56	26	2	1

Appendix H. Exploitation data by length group for rainbow trout/steelhead (RBT/SH) intercepted by Lemhi River irrigation diversions, 1997 irrigation season.

Canal	Date	Trap efficiency releases *(D)*	Trap efficiency recoveries *(d)*	Marked stream recoveries *(n)*
≤ 75 mm (FL)[a]				
L-19	05/20-05/31	0	0	0
	06/01-06/20	0	0	0
	06/21-10/10	4	2	0
L-22	05/06-06/07	0	0	0
	06/08-07/09	0	0	0
	07/10-08/27	2	1	0
	08/28-10/12	0	0	0
L-30	04/29-07/15	0	0	0
	07/16-08/27	0	0	0
	08/28-10/12	0	0	0
L-30A	05/08-05/26	0	0	0
	05/27-06/20	0	0	0
	06/21-07/12	0	0	0
	07/13-09/11	2	1	0
> 75 mm (FL) [b]				
L-19	05/20-05/31	0	0	0
	06/01-06/20	0	0	0
	06/21-10/10	0	0	0
L-22	05/06-06/07	6	1	0
	06/08-07/09	1	0	0
	07/10-08/27	2	0	0
	08/28-10/12	4	2	0
L-30	04/29-07/15	4	2	0
	07/16-08/27	3	1	0
	08/28-10/12	50	16	0
> 75 mm (FL)				
L-30A	05/08-05/26	0	0	0
	05/27-06/20	2	0	0
	06/21-07/12	0	0	0
	07/13-09/11	2	0	0

[a] No RBT/SH ≤ 75 mm were marked and released = M.
[b] Eight RBT/SH > 75 mm were marked and released = M.

Appendix I. Exploitation data by length group for rainbow trout/steelhead (RBT/SH) intercepted by Big Springs Creek irrigation diversions, 1997 irrigation season.

Canal	Date	Trap efficiency releases *(D)*	Trap efficiency recoveries (d)	Marked stream recoveries *(n)*
≤ 75 mm (FL)[a]				
BSC-3	05/06-06/19	0	0	0
	06/20-07/16	22	5	0
	07/17-08/16	8	2	0
	08/17-10/12	39	9	0
BSC-4	05/22-07/13	2	0	0
	07/14-10/12	3	1	0
BSC-5 [b]	05/17-08/06	16	3	0
	08/06-08/19	1	0	0
	08/20-09/13	64	23	2
	09/14-10/12	11	1	0
BSC-5A	05/23-06/28	8	0	0
	06/29-10/12	52	7	0
> 75 mm (FL)[c]				
BSC-3 [b]	05/06-06/19	26	17	0
	06/20-07/16	6	1	0
	07/17-08/16	4	3	0
	08/17-10/12	34	5	3
BSC-4	05/22-07/13	21	9	0
	07/14-10/12	4	1	0
BSC-5 [b]	05/17-08/06	31	14	1
	08/06-08/19	2	1	0
	08/20-09/13	24	13	3
	09/14-10/12	14	1	0
≤ 75 mm (FL)				
BSC-5A	05/23-06/28	5	1	0
	06/29-10/12	17	6	0

[a] Two hundred seventy-nine RBT/SH s75 mm were marked and released = M.

[b] Since the trap efficiency estimates used to expand the recovery data either differed by time period or could not be analyzed with chi-square contingency tests, the recovery data were stratified and used to calculate expanded recovery and associated variance estimates by time period.

[c] One hundred fifty-one RBT/SH >75 mm were marked and released = M.

Appendix J. Exploitation data by length group for rainbow trout/steelhead (RBT/SH) intercepted by Pahsimeroi River irrigation diversions, 1997 irrigation season.

Canal	Date	Trap efficiency releases *(D)*	Trap efficiency recoveries *(d)*	Marked stream recoveries *(n)*
≤ 75 mm (FL)'				
P-3	05/10-08/01	75	8	0
	08/02-10/04	6	0	0
P-4	06/19-09/01	83	24	0
	09/02-10/03	0	0	0
P-5[b,c]	05/10-07/09	5	0	0
	07/10-09/04	94	7	6
	09/05-09/20	10	0	1
	09/21-10/10	0	0	0
P-7	05/13-06/13	0	0	0
	06/14-07/27	8	2	0
	07/28-10/10	52	14	0
P-8A	05/12-09/12	13	0	0
>75 mm (FL) [d]				
P-3 [b]	05/10-08/01	40	11	0
	08/02-10/04	19	3	0
P-4 [b]	06/19-09/01	37	6	6
	09/02-10/03	0	0	0
P-5	05/10-07/09	83	45	154
	07/10-09/04	52	5	8
	09/05-09/20	30	11	30
	09/21-10/10	60	19	9
≤ 75 mm (FL)				
P-7 [e]	05/13-06/13	59	35	3
	06/14-07/27	21	5	0
	07/28-10/10	149	69	5
P-8A [b]	05/12-09/12	43	18	9

[a] Three hundred forty-five RBT/SH s75 mm were marked and released above P-5 = M. An additional 87 RBT/SH s75 mm released above P-8A were not included in the analyses.

[b] Since the trap efficiency estimates used to expand the recovery data either differed by time period or could not be analyzed with chi-square contingency tests, the recovery data were stratified and used to calculate expanded recovery and associated variance estimates by time period.

[c] Although 7 stream release fish were actually recovered, only 6 were used to calculate an expanded recovery estimate since there was no trap efficiency collected during the period 09/05-09/20 when the omitted recovery occurred.

[d] One thousand, one hundred fifty-five RBT/SH >75 mm were marked and released = M.

[e] Since the trap efficiency estimates used to expand the recovery data did not differ over time, the recovery data were pooled to calculate an overall expanded recovery estimate and its variance.

Appendix K. Number of trout observed during snorkel surveys conducted upstream, downstream, and in canals on the Lemhi River, Big Springs Creek, and Pahsimeroi River, Idaho, August 1997.

Canal	Upstream [a]			Downstream			Canal [b]		
	<100 [c]	100-200	>200	<100	100-200	>200	<100	100-200	>200
Lemhi River									
L-19	0	2	0	0	0	0	0	0	0
L-30	0	0	0	0	0	1	0	1	0
Big Springs Creek									
BSC-3	0	0	0	2	1	3	0	0	0
BSC-5	14	1	0	30	18	0	0	0	0
BSC-5A	19	1	0	68	10	2	9	0	0
Pahsimeroi River									
P-4	2	20	3	61	59	23	55	0	1
P-5	2	11	4	7	46	31	4	10	0

[a] Surveys were conducted 100 m upstream and downstream of canal intakes.

[b] Surveys were conducted from the fish screens up to the canal headgates.

[c] Length groups are in mm (FL).

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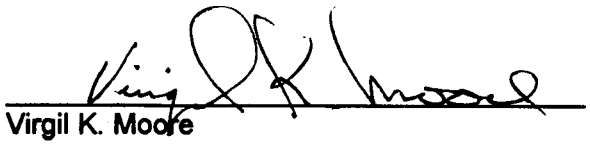
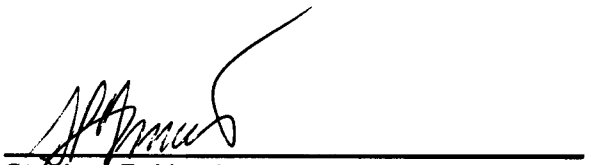
IDAHO DEPARTMENT OF FISH AND GAME



Virgil K. Moore
Chief, Bureau of Fisheries



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